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Ryota Ono *Editors*

The Future Internet

Alternative Visions

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Chapter 1
Introduction to the Future Internet: Alternative Visions

Jenifer Winter and Ryota Ono

Overview of This Book

The Internet is inextricably intertwined with almost every sector of society, increasing its complexity and bringing forth numerous opportunities and challenges. It has been only 50 years from its earliest conception in the early 1960s, to its present state as a vast, *interconnected* network of networks spanning much of the globe and linking approximately 2.7 billion people, representing 39 % of the world's population, by the end of 2013 (International Telecommunication Union 2013). The Internet's global expansion has been the subject of much academic research and policy discourse in recent years. Due to the sociotechnical complexity of these changes, policymakers, businesspeople, and academics worldwide have struggled to keep abreast of developments. In addition to vigorous research to develop Internet standards and technologies that enable the interoperation of billions (and perhaps soon trillions) of computers in various forms, Internet studies has emerged as an interdisciplinary field drawing on both social scientific inquiry and engineering disciplines. Dutton (2013) highlights the broad scope of the emerging field of Internet Studies, and notes that foci address the technologies themselves, as well as design and development; technology use, "including patterns of use and non-use across different kinds of users and producers in various contexts"; and law and policy as it relates to the shaping "the design or use of the Internet, as well as emerging institutions and processes of Internet governance" (p. 2).

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Research and policy visions associated with Ubiquitous Computing, Ambient Intelligence, and the Internet/Web of Things all herald a future Internet in which the integration of myriad, heterogeneous objects into the everyday environment will enable economic growth, and enhance business and government efficiency, environmental sustainability, and personal convenience. In this book, a collection of academic futures researchers and futures practitioners explore alternative visions of the future Internet, presenting a compelling array of visions about how it will continue to reshape our lives—and how our decisions now can help shape this future. This book addresses the future of the Internet, or rather, alternative possibilities for the future Internet. It also focuses on the underlying values, beliefs, and thinking that are influencing the future and presenting alternative visions.

To explore possibilities for the future Internet, we employ a sociotechnical systems approach, focusing on the interplay of technical, social, cultural, political, and economic dynamics to explore *alternative futures*—that is, ones that are not part of the dominant discourse about the Internet. Our authors share perspectives that are not well addressed in current discussion about the future Internet and provide ideas about what might be. Awareness of these dynamics, and the fluidity of the future, is important as we move forward into the uncertain future. Our approach is intended to stimulate dialogue among academics, policymakers, and practitioners on a topic that will underlie most aspects of human life in the near-term future. This chapter begins by introducing the current vision of the future Internet as it appears in technical and policy discourse. We next introduce the field of alternative futures studies, introducing key assumptions and methods of inquiry. Finally, we introduce the individual contributed chapters that provide alternative visions of the future Internet.

Dominant Discourse about the Future Internet

The Internet has been increasingly studied in particular social and organizational contexts, acknowledging the ways in which specific institutional settings, actors, and processes help guide system design and evolution. The technologies associated with the Internet do not merely impact social structures—they are intricately linked to social, political, economic, and political developments—and are mutually shaped by them.

Many of the visions that shape the Internet's development and use are driven and governed by research institutions, corporations, and governments. To some extent, increasing cooperation between the private and public sectors in research and development has caused these distinctions to blur. Although aspects of the future Internet are still not manifest in our daily lives, these initiatives serve as a shared vision, enabling consensus about research and policy problems. In this way, those designing systems play the role of "social engineers" who actively create the future (Callon 1987). While there is not a single vision of the future Internet, there are a number of overlapping, and influential, visions shared between academic and corporate researchers and governments. These all point towards the emergence of a Ubiquitous Network Society (International Telecommunication Union 2005b).

Vision of the Ubiquitous Network Society

The vision of a Ubiquitous Network Society pervades academic inquiry and policy goals. Several related research paradigms focus on the growing presence of heterogeneous computational devices in daily life. The key characteristics of a Ubiquitous Network Society include: (1) The geographic spread of the Internet, with more places becoming networked via fixed or mobile connections; (2) a shift from a one-to-many relationship between humans and computers to one where each person, on average, has many; (3) the embedding of computational intelligence into many aspects of everyday life, enhanced by the miniaturization, increased processing power, and reduced cost of computers; (4) the growth of technical standards enabling machine-to-machine (M2M) intelligence and the subsequent emergence of the Semantic Web (Berners-Lee 2000), a web of interlinked data that can be processed and analyzed by computers without direct human intervention; and (5) the emergence of new ways that humans interact with computers, other humans, and the environment.

In the late 1980s, Marc Weiser first shared the vision of Ubiquitous Computing, a near-term future characterized by the presence of multiple, networked computers per person in the everyday environment that help to extend, rather than burden, human concentration. This vision was featured in a 1991 *Scientific American* article, and has been very influential in subsequent academic research and as a guide to national policy. At its core, Ubiquitous Computing is human-centered and focuses on how to improve human experience in real contexts. Weiser (1991) emphasizes the distinction between virtual reality (where one goes "into" the virtual realm) and Ubiquitous Computing, where the physical world itself is actuated by computers and data:

> Indeed, the opposition between the notion of virtual reality and ubiquitous, invisible computing is so strong that some of us use the term "embodied virtuality" to refer to the process of drawing computers out of their electronic shells. The "virtuality" of computer-readable data – all the different ways in which they can be altered, processed and analyzed – is brought into the physical world. (Weiser 1991, p. 20)

Over time, Ubiquitous Computing research has focused on interaction contexts (Abowd et al. 2002). A related concept, Ambient Intelligence (AmI), arose in the context of the European Union's policy strategy for Information and Communication Technologies (ICTs) (the Fifth Framework Programme, Information Society Technologies, 1998–2002). AmI has focused on context-sensitive smart homes. Corporate visions also emerged. IBM produced the related area of Pervasive Computing (Hoffnagle 1999) during the late 1990s, focusing on technical and business infrastructures. Later, IBM initiated its Smarter Planet strategy (IBM 2008), focusing on the instrumentation of the physical world with trillions of networked sensors. HP has created a similar research initiative, Central Nervous System for the Earth (CeNSE) (HP n.d.).

The Internet of Things

Visions of the Ubiquitous Network Society tend to envision the "proximate future" (Dourish and Bell 2011, p. 133), so it is important to note that it is already present in many forms. More recently, these developments have fallen under the umbrella term Internet of Things (IoT), sometimes called the Internet of Everything (Bradley et al. 2013) or the Web of Things (World Wide Web Consortium 2015). Weber and Weber (2010) describe the IoT as a "backbone for ubiquitous computing, enabling smart environments to recognize and identify objects, and retrieve information from the Internet to facilitate their adaptive functionality" (p. 1). In this regard, the IoT is an emerging global architecture, although like the word ubiquitous, the phrase IoT has been used loosely by marketers and policy makers.

Broadly speaking, the IoT describes an array of developments that seek to uniquely identify and connect a wide range of everyday objects over the Internet, integrating the virtual world with the physical. This global architecture may support billions, or trillions, of heterogeneous objects. A variety of short-range wireless technologies, including radio frequency identification (RFID), near field communication (NFC), and wireless sensor networks (WSNs) enable the increasing instrumentation, measurement, and tracking of objects. In addition to supply chain management, the IoT is being used to collect data to enhance a variety of business processes (Uckelmann et al. 2010). In addition to well-established uses for logistics and supply chain management (Ashton 2009), related applications are being envisioned for a wide variety of industries and uses (International Telecommunication Union 2005a). These include the use of implantable, or even edible, medical devices for enhanced health care (CERP-IoT 2010); smart appliances, homes, and cities (Khan et al. 2012), including "Green ICT" as a means to reduce strain on the environment (Vermesan et al. 2011); real-time pollution and temperature monitoring (Hvistendahl 2012); natural disaster prediction and early warning systems (CERP-IoT 2010); structural engineering applications, such as identifying faults or stress in buildings or bridges (Agrawal and Lal Das 2011); agricultural productivity (CERP-IoT 2010) and food safety (Hvistendahl 2012); improved transportation via sensor-enabled roads and assisted driving (Atzori et al. 2010); and a variety of security-related applications such as radiation monitoring (Ishigaki et al. 2013) and intrusion detection (Khan et al. 2012).

Within the technical literature, there are a number of different foci that are being coordinated by different industrial and research groups and standardization bodies. Atzori et al. (2010) describe three overlapping technical visions that guide IoT research. The first is a things-oriented view that addresses the real-world objects. A 'thing' is something that we wish to instrument or measure. These could be objects such as articles of clothing, automobile parts, livestock, plants, the human body, or even a particle-sized bit of paint. Things must also be able to communicate with other objects using short-range communication technologies. RFID is the most commonly discussed standard at this time, but there are a wide variety of possibilities, including NFC-embedded smartphones, nanoelectronics, sensors, or other

embedded systems (Vermesan et al. 2011; Vermesan and Freiss 2013). Communication-enabled things can measure, compute, monitor, and communicate information about a wide variety of data from the environments they are embedded in. In addition to laptops, mobile phones, and other types of familiar computers, we are increasingly encountering many small, often invisible, devices that are not typically thought of as computers.

A second IoT-related vision focuses on the networks themselves. Over the past decade, a variety of short-range, wireless technology standards have matured, including RFID, NFC, and wireless sensor networks based on IEEE 802.15.4. At this time, a variety of communication standards are still in development to connect these intranets of things to the Internet. To allow these intranets to connect to the global Internet, flexible, open standards are required.

The final vision guiding IoT development is semantic-oriented. In the near future, the data being collected by things will be enhanced by technical standards for linking structured data via the World Wide Web. This "linked data" allows machine intelligence to process the growing amount of data on the World Wide Web (Heath and Bizer 2011). Vermesan et al. (2011) describe things as:

> active participants in business, information, and social processes where they are enabled to interact and communicate among themselves and with the environment by exchanging data and information "sensed" about the environment, while reacting autonomously to the "real/physical" world events and influencing it by running processes that trigger actions and create services with or without direct human intervention. (p. 10)

Semantic specifications focus on how to organize, store, and search for objects and data related to the IoT. Attention focuses on developing software agents that can independently search and perform tasks over the Web and on the underlying communication standards that allow information exchange (Vermesan et al. 2011). Ashton (2009), credited with first using the phrase Internet of Things in 1999, argues that the purpose of IoT research is providing computers:

> with their own means of gathering information, so they can see, hear and smell the world for themselves, in all its random glory. RFID and sensor technology enable computers to observe, identify and understand the world – without the limitations of human-entered data. (Ashton 2009, para. 5)

In addition to the technical foci outlined above, the Ubiquitous Network Society has been used as a guiding vision in national policy strategies. An influential report on the emergence of Ubiquitous Network Societies by the International Telecommunication Union (2005b) highlighted ICT policy initiatives by Japan, South Korea, and the European Union that focused on related technologies. Japan's u-Japan policy strategy (2004–2010) sought to realize the first Ubiquitous Network Society by 2010 (Ministry of Internal Affairs and Communications 2006). Moving forward from success in developing broadband infrastructure and use nationwide, u-Japan focused on the use of ICT to solve social problems, including caring for a rapidly aging population via Ambient Intelligence (e.g., smart homes that could monitor elders' well-being), protection against food contamination (e.g., by tagging and tracking foods for ease of recall), and creating early warning systems for natural

disasters. This strategy was described as "a paradigm shift to a world in which ICTs become as natural as air or water" (International Telecommunication Union 2005b, p. 22). South Korea reformulated its ICT master plan (IT839, 2004) as u-IT839 in 2006, focusing on the integration of the "real" and cyber worlds (Oh 2008). Similarly, the European Union's Directorate, General Information Society and Media began to focus on the IoT in 2005 under the i2010 policy framework for the information society and media (2005–2010) (European Commission, Community Research and Development Information Service 2012). The European Union has also funded the CASAGRAS (Coordination and support action for global RFID-related activities and standardization) program, in order to coordinate international issues related to the IoT. The CASAGRAS project seeks to foster development of a global infrastructure that links physical and virtual objects. In 2010, China also shifted its strategic ICT focus to the IoT, and it has become a focus point in China's 12th Five Year Plan, guiding policy from 2011 to 2015 ("China working on unified national Internet of Things strategic plan," 2010, July 5; Hvistendahl 2012). China's coordinated strategic development has included the development of an IoT Center in Shanghai; development of the city of Wuxi (and other cities in Jiangsu) as an IoT industrial park and research and development center, and centers in the province of Guangdong focusing on standards development and building technical ties to Macau and Hong Kong.

Public Awareness and Discussion

The developments associated with the Ubiquitous Network Society are already present in many forms. However, many—such as tiny, embedded sensors or standards enabling linked data and machine analysis—are not visible or widely discussed by citizens. Corporate public relations and advertisements, as well as government policy visions, focus on the Ubiquitous Network Society as a way to fuel economic growth, enhance business and government efficiency, add convenience and self-feedback for consumers, improve physical security, and enhance scientific knowledge. The messages that the public encounters are techno-utopian narratives that envision ICT as a means to better human life, yet there is little critical discourse or inclusion of non-experts. These techno-utopian narratives imply that technological development is positive and necessary, and that ICT will dramatically alter the meaning and practice of life in the near-term future—for example, reducing income inequities, improving public health, or mitigating humans' negative impacts on the environment. Essentially, this is a technologically deterministic view, suggesting that global ICT development is moving us towards an ultimate goal (*telos*). This view also suggests that ICT is separated from situated social, cultural, and economic phenomena: ICT affects our lives, but we have little influence in the development or rejection of technologies. Critiquing this techno-utopian and deterministic view encourages realistic assessment and greater public participation in the development of ICT and the communities it is embedded in. A number of Science

and Technology Studies (STS) scholars have developed theories of technology and social change that more directly examine ICT and network-centric dynamics (Lamb et al. 2000; Kling 2000). The relationship between the social and technological is not limited to technology impacting the social realm—they are mutually arising phenomena, enmeshed with sociocultural, political, economic, or scientific aspects.

Risk society theorists (Giddens 1990; Beck 1992) argue that modern life is characterized by human-created risk borne of technological developments. Threats such as global warming or reliance on automated systems are embedded in technocratic processes that place little value on public input. Modern societies "both manufacture and must control risk. Risks are not just moments of danger as we forge forward: they are the process itself" (Woollacott 1998, p. 48). Increasingly, trust in the expert systems that enable them is eroding. Therefore, public policy makers must consider not only scientific data, but also global institutional networks and public attitudes. The process of risk assessment and decision making, currently left to the scientific and policy communities, must more actively engage the public. The techno-utopian vision of the future Internet is encountered by citizens in a variety of ways. The most visible manifestations include mobile phones and smart appliances. Global mobile subscriptions reached one billion in 2002, and in 2015 reached over seven billion (International Telecommunication Union 2013, 2015). Smart appliances enable consumers to monitor or communicate with home appliances such as washing machines or refrigerators. Corporate advertising and scenarios about the near-term future focus on convenience, connectivity, and social well-being. IBM, as part of their Smarter Planet strategy, has created a number of video advertisements with problem scenarios addressed by the IoT. In one, the town of Bolzano, Italy, faces caring for a growing elderly population. The video's narrative shows IBM's Smarter Cities team working with local authorities to outfit elderly residents' homes with sensors that enable the city to monitor their health and send workers to care for them based on this intelligence (IBM 2013). In another advertisement, IBM shows connectivity between cars, telematics data, and smartphone apps that are intended to add new, value-added services to consumers (IBM 2014). In addition to convenience, these scenarios are presented as a means for cost savings. Further, the underlying instrumentation of the natural world presents the opportunity for economic growth. In one video, networking equipment manufacturer Cisco describes the IoT (here, called the Internet of Everything) as the "new economy," hinting at the possibility of endless growth through data analytics. Governments' engagement with citizens in relation to the IoT has focused on describing potential social and political goods, such as health and assisted living, protection from terrorism or natural disasters, or intelligent transportation. A focus on techno-utopian possibilities leaves little room for critical reflection or discussion by citizens. There has been little attempt to understand communities' ideas about what constitutes a desirable future Internet. Involving citizens early on (i.e., problem identification, agenda setting) allows a broader range of concerns to be voiced and may also increase acceptance and public commitment in the overall planning process. Establishing such a dialogue also helps to educate stakeholders about emerging issues that may significantly affect their lives. Because the future is characterized by uncertainty, alternative methods

for exploring possible futures via negotiation by multiple stakeholders can help us to shape more desirable outcomes. The second section of this chapter introduces the field of alternative futures studies, which underlies all discussions of the future Internet in the following chapters.

Uncertainty of the Future

Human beings are mostly interested in knowing the future. If we are able to know something in advance, we are able not only to use the knowledge to benefit ourselves or others but also to reduce our anxiety about the future. The future, however, continuously negates our efforts to know it beforehand and reminds us that it is more uncertain than we expect. Even so, we cannot help but move forward, trying to identify as many certainties as possible to guide our actions.

The same can be said in relation to the future Internet, which may change in unexpected ways while still playing a significant role in future human endeavors. Thus, we need to identify as many certainties as possible to make the best use of the future Internet. The most often used method to understand possibilities for the future Internet is to collect information that we consider useful for forecasting its development. We believe that such information is the best guide for understanding uncertainty. By collecting, processing, and analyzing such information, we seek to build a framework that acts much like a telescope through which we gaze out at the future Internet.

This information-oriented approach to the future may have stemmed from the approach adopted by most academic disciplines in their research (Dator 1996), aimed at distilling something certain from something uncertain. In this endeavor, information is essential, as findings always depend upon evidence from data analysis. One weakness of such an approach is that those disciplines unconsciously assume that they can determine, with certainty, future phenomena or events as long as they employ rigorous methods of data collection and analysis.

The technologically deterministic view of the future Internet exemplifies such an approach to the future. Those who adopt this view observe technological developments and societal changes in the past and present, analyze the relationship between them based on the belief that the former must be the cause of the latter, and then use the causal relationship to forecast the future Internet. This view, as well as those associated with most academic disciplines, misses an undeniable fact: regardless of what is assumed and believed by researchers, how much data is collected, and how sophisticated the analysis performed, the future continues to be uncertain.

By definition, the degree of uncertainty about the future is typically far greater than in the present: the future is unknown, and extrapolations based on present knowledge are unlikely to aid us in facing the future (Bell 1997; Inayatullah 2002a, b). Bell (1997) argues that, while our knowledge about the past can help us understand the validity of our beliefs, it is inadequate to deal effectively with unknown situations in the future. Thus, we need to alter our approach to examining the future.

A new approach is offered by an interdisciplinary academic discipline called "Futures Studies" and "Futures Research." What distinguishes futures studies from most academic studies is that it values and tries to *understand* the uncertainty of the future. Acknowledging the inherent uncertainty of the future helps us to expand our ideas about the unknown future. If we stick to and only value certainty, our options and choices end up very narrow. If we are open to uncertainty, though, we become open to various possibilities in the future. In fact, the concept of "possibility" is what futures studies most treasures and what other disciplines negate (Dator 1996).

Understanding the Future Internet through Futures Studies

In order to study the future Internet, futures studies provides us with the most appropriate perspective. In addition to its attitude towards uncertainty, futures studies has several characteristics that help us examine the uncertain future.

First, futures studies understands that novel events (not foreseen by extrapolation) will surely happen in the future (Bell 1997). While many events that occur in the future may look similar to events in the past, and these similarities enable us to plan for the future based on previous experiences, something unexpected or unthinkable has occurred many times in human history. One example is the appearance and/or spread of an entirely new technology. In the ICT arena, telegrams, the telephone, microwave transmission, satellites, fax, cellular phones, the Internet, and smart phones are all such technological developments, which had been unthinkable before. Each of these was transformative.

Second, a theoretical tenet of futures studies is that people's *images of the future* actively shape both individual and group action (Polak 1973; Bell 1997). Futures studies assumes that an image of the future is a prerequisite for human action, as this is what motivates us to action. Without an image, we are unable to move forward. As Rubin (1998) notes, "a person's orientation toward the future is based on making these mental images a part of reality and then directing his or her actions and decision making along the lines drawn by these images" (p. 499). Dator (2002) states that, "futures studies does not try to study 'the future', since 'the future' does not exist to be studied. What does exist, and what futurists can and often do study, are 'images of the future' in people's minds" (p. 7). According to Bell (1998), "no theory of society and social change is complete if it does not incorporate the idea of the image of the future" (p. 327). Thus, images of the future are key to understanding the contours of the future.

Third, futures studies claims that the shape and nature of the future will be determined by images of the future conceived by people living in the present (Bell 1997). People's images continue to change, their actions and behaviors deriving from those images change and, as a result, our future changes. Thus, the future is not completely predetermined. Although present circumstances do constrain the development of future events, *the future can be influenced by human action*. Clearly, human

beings cannot control many aspects of the natural world, but we are able to control other natural and social events. Having the power to shape the future of human societies is one of the greatest privileges and responsibilities of human beings. Futures studies reminds people of this power and encourages them to use it wisely.

The characteristics of future studies outlined above suggest that a new image of the future will bring about a new kind of future. Therefore, we can conclude that the most effective way to forecast the future is not to focus on the most probable image but to examine multiple images of the future. While the dominant perspective is useful to show us a probable image of the future, futures studies helps us to pay attention to future possibilities in a much wider context. Thus, in order to see the future of the Internet, we should see it not from the dominant perspective, which is mostly derived from the past successes of the Internet, but from outside the established culture of the Internet, allowing new images to be explored and critiqued. The authors in the following chapters will elaborate a variety of images of the future from their respective unique perspective in order that the contours of the future are more extensively delineated.

Scenarios in Exploring the Future

An often used method in forecasting the future is an extrapolation of a variety of variables. The technologically deterministic view, for instance, uses this method to forecast the future from the trends in the present with regard to new technological developments. The extrapolation reflects an assumption unconsciously shared by many planners that the future will emerge as the extension of the past and the present (Heijden 1996). The extrapolation satisfies the need of planners, which is to find *an answer* as a result of their forecasting efforts. These planners believe that it is possible to forecast the future somewhat accurately and the endeavor for such a goal is worthy (Heijden et al. 2002).

Extrapolation may be useful when forecasting is done on the near-term future, where it is reasonable to assume that the present environmental conditions may not change much during the time frame. If this condition is not met, however, using extrapolation to forecast the future is quite problematic. For instance, it won't reveal what uncertainty remains because it focuses on revealing what can be declared certain (Heijden 1996). Extrapolation requires the planner to determine what the planner is interested in finding out in the future. Once this choice is done, any uncertainty falls of out of scope of the forecasting work. Also, extrapolation is often adopted when some ongoing strategy or policy needs to be supported in the future (Heijden et al. 2002). When this method is chosen with this agenda in mind, the resulting forecast will end up representing an artificial future.

Futures research/studies offers a better method of forecasting, *future scenarios.* Herman Kahn, who used this term for the first time, describes scenarios as "a hypothetical sequence of events constructed for the purpose of focusing on causal pro-

cesses and decision points" (Kahn and Wiener 1967, p. 6). Wilson (1978) explains several key characteristics of a scenario: it is hypothetical and will never come true as it is depicted; it should not be the full details but only an outline; and, it is multifaceted and holistic in the approach to the future. He writes that a scenario seeks:

> only to map out the key "branching points" of the future, to highlight the major determinants that might cause the future to evolve from one "branch" rather than another, and to sketch in the prime consequences of a causal chain. (p. 226)

A scenario is an imaginary environment or sequence of events, one of an infinite number of "stories" that can be told about possible alternative futures (Schwartz 1996). They are not forecasts or presented as such. Rather, they are intended to displace readers from a present-focused mindset and enable them to "systematically explore, create, and test consistent alternative future environments that encompass the broadest set of future operating conditions" (Glenn 2009, p. 3). Scenario development is based on a holistic approach that recognizes the interdependence of social and technical system elements.

Heijden (1996) argues that in order to correctly understand the meaning of multiple data and information one's mental model needs to be multifaceted and holistic. Alternative futures scenarios are thus an effective tool by which one's mindset is trained to be open to a variety of information. Heijden et al. (2002) state that scenarios help people to confront unexpected changes and uncertainty, to give a chance to examine one's mental model, to broaden it, and to correct their inherent aversion to the uncertain future.

To create a scenario, a focal issue and "driving forces" that are at work in the present are identified, along with a few key trends or events that could lead to significant changes in the future. These include key factors in the local environment and driving forces in the macro-environment, i.e., major trends in society, technology, politics, the economy, and the environment (Schwartz 1996).

This book is a collection of such future scenarios. It presents not only visible, but also invisible, facets of alternative futures. How the future Internet will appear, its shape, and functions all depend on what assumptions, values, and ideologies present, as well as future, generations choose. We would like to see that critical decisions are made consciously and not by a small number of powerful stakeholders but by all beneficiaries of the future Internet. We expect that the following chapters will help achieve this goal.

Introduction to the Chapters

The following chapters convey different perspectives about the future Internet, highlighting many different uncertainties and preferences.

Rex Troumbley ("Coercive cyberspaces and governing Internet futures") examines how early images of cyberspace that viewed Internet freedom as a technologized neoliberal marketplace of ideas shaped discourse about the Internet, then

analyzes how economics, security, and environmental change shape the future of the Internet. Using Google as a case study, he shows how Internet companies direct development towards corporate visions and shape users' behaviors so that users act as predictable consumers. He also examines the creation of an alternative system of Internet governance based upon "multistakeholder" principles, and argues that this process is part of a corporate futures vision that monopolizes creativity.

Mario Guilló ("Futures of participation and civic engagement within virtual environments") examines the gap between the theoretical potential and the actual performance of the Internet in relation to civic engagement and presents a typology of those participation processes that are taking place within social networks, focusing on the forces that could influence the way in which citizens participate via the Internet in coming decades. He examines several participatory foresight initiatives taking place over the Internet and describes challenges related to increasing the participation of different actors in the common task of solving global problems and taking concrete action.

Sohail Inayatullah and *Ivana Milojević* ("Power and the futures of the Internet") explore power and the futures of the Internet. While speed and access have led to new applications that can help the disadvantaged, the deeper transformative change, to date, has been the power of the few to dramatically influence the many, and centers of (former and current) power continue to receive much more attention than globally marginalized spaces. They examine how, as the future Internet extends its reach into space and the deep inner spaces of our minds, power will be circulated and explore whether reality will always be a realist zero-sum game.

Sirkka Heinonen ("The future of the Internet as a rhizomatic revolution toward a digital meanings society") challenges the idea that we can separate technology from natural life. She describes the current evolution of the Internet according to a rhizomatic model, where knowledge is not disseminated systematically or logically based on a hierarchical binary tree-model, but follows the organic way of rhizomes to grow in all directions, penetrating all available niches. She claims that this new model heralds a *digital meanings society*, where people using the Internet are empowered in their search for meaning in all activities and meaning becomes the main capital.

Aubrey Yee ("An Internet of Beings: Synthetic biology and the age of biological computing") describes the pending merger of biology and technology, where synthetic life will become indistinguishable from natural life. She describes the Internet as playing a central role in the production of synthetic life forms by providing the platform for global collaboration—the capacity to literally transport life through space via strands of DNA code. She notes that advances in bioengineering have blurred the distinction between beings that are built and those that are born, and discusses the ethical, cosmological, and political challenges that accompany this transition to an Internet of Beings.

John Sweeney ("Infectious connectivity: Affect and the Internet in postnormal times") uses the concept of Postnormal Times to investigate the Internet's infectious connectivity, exploring the emerging forces and issues pushing and weighing the Internet in the years to come. Wielding black swans, black elephants, and *black*

jellyfish—a new concept for emerging issues analysis—to seed scenarios for and within the context of postnormal times, this chapter uses the Three Tomorrows method to construct and extrapolate the concept of infectious connectivity, which aims to understand the ways with which Internet-related factors and forces can and might affect our all-too-human bodies.

Jenifer Winter ("Algorithmic discrimination: Big data analytics and the future of the Internet") discusses several technical changes related to the Internet—the social semantic web and linked data, the instrumentation of natural and social processes (e.g., Internet of Things), big data analytics, and cloud-based facial recognition—focusing on several related threats. As billions, or trillions, of everyday objects, including the human body itself, are equipped with sensors, a variety of new types of data will be collected, aggregated, and linked to other personally identifiable records. She argues that these changes transgress personal privacy boundaries and lead to unjust algorithmic discrimination and loss of anonymity, resulting in undemocratic shifts in power.

Ana Bossler ("Metadata analytics, law, and the future of the Internet") draws on Bauman's (2006) concept of a fluid society, where the Internet emulates market networks, to describe the growing strategic importance and value of personal information. From a legal perspective, she discusses the rise of metadata analytics and a growing economic model where citizens are the product. She argues that the Internet, as a new political-economic space, has established a new frontier where the relationship between constitutional law (i.e., the political dimension) and regulation (i.e., the economic dimension) has the potential to produce a new legal framework that takes these challenges into account.

Rolv Bergo and *Dan Wedemeyer* ("Information, noise, and the evolving Internet") argue that, as mobile standards and devices continue to advance, we will be connected in a much more symbiotic way. Instead of accessing the Internet using traditional means, more dynamic interfaces like speech, presence, gestures, and thought control will evolve and be seamlessly integrated into our daily lives. Drawing on Anthony Giddens's (1990) concept of reflexivity, they examine technical changes related to the near-term Internet, the growing tension between information and noise (misinformation and disinformation), and discuss implications for the policymaking process.

José Ramos ("Liquid democracy and the futures of governance") argues that Internet technologies, coupled with new political cultures, herald radical transformations in democratic decision-making. He examines how emerging technologies deepen democratic participation, how we might avoid or transform futures where the Internet is employed to maintain political-economic oligarchies of power, and what new political cultures and contracts may emerge through the convergence of the Internet and political engagement. Using the example of the recent Liquid Democracy on-line decision-making experiments in Germany, he argues that we are witnessing a shift from formal representative democracy to situational and fluid forms of governance.

Enric Bas ("The Liquid Self: Exploring the ubiquitous nature of the future Internet and its pervasive consequences on social life") examines the role of the Internet in socialization processes and identity formation worldwide. He argues that

human beings are at a historical crossroads resulting from both existing and potential technological advances that may induce radical bifurcations concerning social change and human evolution. He notes that we are heading towards the convergence of physical and virtual worlds via the Internet of Everything; with true ubiquity of the Internet and no option for voluntary disconnection, the relationship between machines and humans will be altered.

Conclusion

This introductory chapter described the dominant techno-utopian vision of the future Internet that guides corporate and governmental strategies. The chapter also introduced the field of alternative futures studies, a means to perform systematic thinking about alternative futures that underlies all discussions of the future Internet in the following chapters. It was argued that current discourse leaves little room for critical reflection or discussion by citizens about what constitutes a desirable future Internet and that establishing such a dialogue is essential. It is our intention that this goal will be furthered by the work presented in this volume.

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Chapter 2
Coercive Cyberspaces and Governing Internet Futures

Rex Troumbley

Before examining the dominant drivers pushing alternative Internet futures, it is important to acknowledge that what we call "the Internet" is not well defined. Fearing Internet-centric views of society, policy, and the future, Evgeny Morozov has gone so far as to call for a "moratorium on using the very term 'Internet'" in favor of "more precise terminology, like 'peer-to-peer networks' or 'social networks' or 'search engines'" (Morozov 2013, p. 44). Morozov points out that rapid changes to connected hardware, protocols, technology standards, devices, interfaces, users, and online services render any stable notion of "the Internet" that can be captured using a referential title are ultimately meaningless. If there is such a thing as the Internet, argues Morozov, most users experience it as a collection of services administered by a handful of monopolistic technology companies. This survey of trends, values, and forces shaping the Internet's future begins by conceding Morozov's point that there is no such a thing as an inherent Internet. However, rather than make judgments about what counts as part of the Internet or dispel myths about the Internet by using more specific referential language, this chapter will focus on how something became the Internet, what kinds of internets are being constructed, and which forces are shaping its future.

Despite ambiguity about what is meant by the Internet, there are conventions that regulate how we speak about the Internet and some points of agreement about the Internet worth examining. First, nearly every account of the Internet agrees that it is an artificial construction which can be reconstructed according to the wants, needs, and changing desires of the agents who use it. Many visions of the Internet's future recognize its fundamental plasticity even while they argue against changing its current organization. Representative examples include Harvard Law Professor Jonathan Zittrain's 2008 book *The Future of the Internet—And How to Stop It* (Zittrain 2008),

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Internet activist Rebecca MacKinnon's book *Consent of the Networked: The Worldwide Struggle For Internet Freedom* (MacKinnon 2013), and *The New Digital Age: Reshaping the Future of People, Nations and Business* (Schmidt and Cohen 2013) by Google CEO Eric Schmidt and former US Secretary of State staffer Jared Cohen. The authors of these texts argue that the Internet is simultaneously static and also threatened by various forces working to alter it. The authors of these futures argue that the Internet should be preserved as it is and that the principles of its original designers be extended into the future.

A good example of the recognized malleability of the Internet, and the wish to preserve its organization, can be found in contemporary debates about Net Neutrality, which holds that Internet service providers should treat all data equally because, they argue, the equal treatment of data was a principle of early Internet designs. These conservationist visions of the Internet also recognize how quickly the Internet changes as its services change and content is modified. Despite the popular belief that once something is "on the Internet" it stays there forever, preservationists know better. Zittrain (2008) sees numerous changes coming to the future of the Internet that must be stopped in order to promote "generativity" and innovation, especially growing numbers of Internet-connected devices like iPhones and Chromebooks with carefully managed "ecosystems" tethered to a service provider. Zittrain and Net Neutrality proponents agree that the Internet can change, and that it is now very different from the ARPANET and TCP/IP packet-switched network which preceded it, but they argue for a future of the Internet that privileges the interests of users over corporations—even if that means arresting the current iteration of the Internet and making sure it lives into the future. The Internet is a fiction, but so too is the future, since it also does not exist.

Unmasking the Internet as a fiction does not disable those working to create different versions of an Internet for their own futures. More important than unmasking or, following Morozov, using more specific terminology to describe what we mean by "the Internet" is understanding how these fictions garner as much power as they do, how they organize life, and who is empowered to create them. Following Bruno Latour's argument that "we have to take advantage of the powers of fiction if we are to be able to tell each other stories, make plans, propose scenarios, or draw up programs of action" (Latour 2013, p. 391), the question about what counts as the Internet is far less important than determining when fictions like the Internet are mobilized in support of political arguments and alternative futures. There are many such arguments and alternative futures being created about the Internet today and, as we will see, past images of the Internet's future have had an incalculable influence on the Internet and how we think about its futures. Whether or not we can agree on what counts as "the Internet," most visions of its future agree that it is both artificial and open to change. The question then becomes: Which Internet futures are being created, and what forces are pushing them into existence?

This chapter will answer that question by examining the most important drivers of the Internet's future today: economics, security, and environmental change. These drivers are not discrete, and each force interacts with the others to drive alternative futures forward. Economics, for example, drives not only the use of the

Internet as a medium for exchanging goods and services, but has also driven the capitalization of data collection, which in turn enables mass surveillance by security institutions using the Internet to combat terrorism. Both of these forces together are also encouraging interventions into the behaviors of users which, as we will see, has made user predictability a major secondary driver of Internet futures. Additionally, no survey of the dominant drivers pushing the Internet's future would be complete without considering how earlier visions, especially the science fiction genre "cyberpunk" and the fantasies of neoliberal markets, have shaped our current Internet and the possible alternatives we consider for its future. This chapter begins by considering how earlier images of the future continue to influence popular debate and pull institutional policies towards a future Internet made of virtual "cyberspaces," making it difficult to confront the environmental cost of running the Internet. As a driver, environmental change also intersects with economics and security, for example spurring the development of "cloud computing" and the centralization of secured networks which were before thought to be fundamentally decentralized for environmental conservation. Next, the chapter will examine how corporations use Internet users to promote a corporate future of the Internet, encourage users to behave predictably, and prevent users from creating alternative Internet futures or participating in its future governance. The chapter then gives three scenarios, in the form of dispatches or written artifacts, from alternative Internet futures based on trends driven by economics, security, and environmental change. Finally, the chapter concludes by arguing that the best Internet futures are those which do not imagine the Internet as immortal or immune from change, but question whether the current Internet we have is the best we can do and imagine alternatives for life after the Internet's future ends.

"Cyberspace" Pulls the Internet into Virtual Spaces

Despite having little in common with Norbert Wiener's theory of cybernetics (Wiener 1965, 1988), the dystopian imaginings of "cyberspace" in the cyberpunk science fiction genre have fundamentally shaped the Internet. William Gibson's novel *Neuromancer* (Gibson 1986), which appeared 11 years before the first web browser, describes cyberspace as:

> A consensual hallucination experienced daily by billions of legitimate operators, in every nation, by children being taught mathematical concepts … A graphic representation of data abstracted from the banks of every computer in the human system. Unthinkable complexity. Lines of light ranged in the nonspace of the mind, clusters and constellations of data. Like city lights, receding … (Gibson 1986, p. 32)

While using the Internet or the Web might have some similar features to Gibson's description, Wendy Chun has argued that "if cyberspace and the Internet have become conflated, it is due not to inherent similarities between them but rather a *desire* to position Gibson's fiction as both an origin and end to the Internet" (Chun 2008, p. 42). Gibson's cyberspace pulls on other images of the Internet and on its

future by setting up the standards or conventions by which people imagine. Gibson's description of a virtual realm through which hacker cowboys navigate through virtual cities has excited engineers and policymakers for decades, and has made creating cyberspace out of the Internet a priority.

Liberation and Danger

Thinking about the Internet as a virtual space has inspired many continuing fantasies about the inherent ungovernability of this virtual space, especially by governments that are thought to be too slow to catch up and regulate technologies they cannot understand. A prominent example of this is John Perry Barlow's 1996 "Declaration of the Independence of Cyberspace" in which Barlow proclaimed:

> Governments of the Industrial World, you weary giants of flesh and steel, I come from Cyberspace, the new home of Mind. On behalf of the future, I ask you of the past to leave us alone. You are not welcome among us. You have no sovereignty where we gather…We are creating a world where anyone, anywhere may express his or her beliefs, no matter how singular, without fear of being coerced into silence or conformity. (Barlow 1996, para. 1, 8)

While this kind of utopianism has been tempered in recent years, Barlow's cyberpunk image of the Internet as cyberspace ignores the role of the US government in developing the Internet, not only its development as a military communications technology, but also the continued sponsorship of the Internet through National Science Foundation grants. Indeed, the Internet Barlow describes is the Internet which the US government decided to privatize and open for commercialization in the mid-1990s. Barlow's willful ignorance is important, as we will see later in the section on governance, because cyberpunk images of cyberspace require governments to keep their hands off the Internet just as they are told to keep their hands off economic markets.

The popularity of cyberspace as a virtual space in which people can navigate without governmental inhibition also inspired recurring moral panics over child access to pornography and fueled fears over its use to spread harmful ideas or child pornography. "Through cyberporn, the pedophile and the computer-savvy child became hypervisible figures for anxiety over the jacked-in computer's breaching of the home" (Chun 2008, p. 28). These fears called on Barlow's weary giants to step in, and the US Congress introduced numerous pieces of legislation aimed at making the Internet, and its users, safe. This has made security a major driver of Internet futures. Responding to the dangers, the US Congress passed the *Communications Decency Act* in 1996 and the *Child Online Protection Act* in 1998. Both acts described the Internet as cyberspace, even as territories, which needed to brought under the control of governments. The acts required instruments like credit cards or adult personal identification numbers to separate minors from adults, fueling both the commercialization of the Internet and the surveillance of previously anonymous behavior. Gibson and Barlow's images of the Internet as an ungovernable

cyberspace, potentially liberating and dangerous, helped make economics and security a primary driver of Internet futures.

The proliferation of the prefix "cyber" has been used to make communications technologies seem weird and wonderful, authorizing interventions into their operations and becoming an organizing logic of security institutions which see the Internet as a space for cybersecurity. For security futures, using a computer to illegally transfer copyrighted material becomes a "cybercrime," attempts to disrupt communications by states or international organizations becomes "cyberwarfare," and using Twitter to share radical sentiments becomes "cyberterrorism." One clear example of cyberpunk pulling security futures is the formation of security groups like the US Army's Cyber Command unit which is tasked with the ambiguous job of defending cyberspace and preventing a "cyber-Pearl Harbor" (Bumiller and Shanker 2012). In order to carry out its mandate, the Cyber Command unit is in the business of continually convincing the public and Congress that cyberspace exists and is under threat from unseen or hypervisible enemies which its security technologies are able to manage. Especially since 9/11, securitization has become a dominant driver of Internet futures.

Powering the Virtual

The image of cyberspace reinforces Cartesian distinctions between minds and bodies, creating a difference between the "real" material world of hardware and the "virtual" immaterial world of software—where the Internet is supposed to exist. This forced distinction between virtual and physical can make it difficult to see the environmental costs of not only discarded hardware, so-called toxic "e-waste" often dumped in poor regions of China or Africa, but also the enormous amount of electricity consumed by the virtual world of the Internet as electrons travel through wires and radio waves. In 2012, it was estimated that data centers worldwide used about 30 billion watts of electricity, or the same output as 30 nuclear power plants, and that the US alone was responsible for about one-third of that usage (Glanz 2012). Internet service companies keep their facilities running around the clock, consuming 90 % of this energy by keeping their servers idling regardless of demand, because users unable to quickly access company services or their personal data are likely to abandon their services for a competitor. While Facebook, Google, and Apple have taken steps to convert their facilities from fossil fuels to renewable energies, the idea that the Internet is a virtual cyberspace ignores the energy required to keep cyberspace running. In a 2013 keynote presentation at the Googleplex titled "How green is the Internet?," energy researcher Jon Koomey estimated that the Internet is probably responsible for about 10 % of the world's total electricity consumption (Renzenbrink 2014).

While only rough estimates have been given for the amount of electricity specific Internet services use, according to some measures a single search uses about 1080 J of electricity, which is equivalent to powering a 60 W light bulb for 17 s (Newman

2011), and a 140-character Tweet consumes about 90 J, enough energy to power that same light bulb for 1.4 s (Schwartz 2010). People conditioned to recycle or turn off the lights when they leave a room are also conditioned to expect online services to load quickly and be able to instantly find archived e-mails. These energy costs are not lost on Internet technology companies. Google, Microsoft, Adobe, and other software companies are capitalizing on environmental concerns by encouraging users to migrate inefficient private data processing and storage into their renewable "cloud" servers and services. Google sponsored a study on cloud computing by the Lawrence Berkeley National Laboratory, widely publicizing the researchers' conclusion that migrating all productivity software, e-mail, and customer service applications currently run in the offices of US businesses to the cloud would reduce energy consumption by 87 %, or enough energy to run Los Angeles for a year (Brandon 2013). While still an early trend, the centralization of the Internet based on energy concerns is likely to increase as Peak Oil and e-waste management make powering cyberspace more difficult.

Coercive Architectures and Governing Futures

Gibson's cyberspace, or the Internet, might not have much in common with Norbert Wiener's theory of cybernetics, but Wiener's theory of feedback and control resonates with the new oligarchs of the Internet. It is through the proliferation of tethered devices, connected to public and private internets, that earlier schemes of social engineering for the improvement of humanity are being augmented with what Richard Thaler and Cass Sunstein call "choice architecture" in their book *Nudge: Improving Decisions About Health, Wealth, and Happiness* (Thaler and Sunstein 2008). Thaler and Sunstein use the language of cybernetic feedback to describe systems which deploy "relatively weak, soft, and nonintrusive" interventions into the behaviors of users navigating the architectures created by enlightened architects in order to "preserve liberty" (Thaler and Sunstein 2008, p. 5). Their book gives numerous examples of nudging in action, from the reduction of splattered urine at the Schiphol Airport in Amsterdam by giving men something to aim at with an etched image of a black housefly drawn inside the urinal, to the use of open stairwells in building design to encourage employees to walk more. Thaler and Sunstein unabashedly call their design concept "liberal paternalism" and, relying heavily upon rational choice theory and the neoliberal theories of Milton Friedman, argue that these interventions are superior to governmental regulations because "choices are not blocked, fenced off, or significantly burdened" (Thaler and Sunstein 2008, p. 5).

Internet companies in Silicon Valley have been quick to experiment with these indirect methods for steering their employees. Google's Human Resources department, for example, performed data collection and observational methods it called "People Analytics" on its employees' cafeteria eating habits and then redesigned the cafeteria's architecture in order to encourage visitors to eat more vegetables.

The salad bar is the first thing a visitor sees when entering the cafeteria because the People Analytics team discovered that people tend to fill their plates with what is seen first. Desserts are placed behind the salad, so anyone wanting a donut will have to reach past leafy vegetables to get it. Plates are smaller to encourage less eating overall, and color coding pairs green labels with vegetables and dangerous deserts with red labels (Kuang 2012). To use Thaler and Sunstein's language, Google is using libertarian paternalism to "move people in directions that will make their lives better" (Thaler and Sunstein 2008, p. 6). The Googleplex at Mountain View is famous for providing its employees with freely available amenities like 24 h cafeterias, on-demand use of company electric vehicles, "EnergyPods" for high-tech napping, complimentary haircuts, dry cleaning, and gym access. Taken together as part of a choice architecture scheme, we can see that many of these amenities serve to nudge employees into working a bit longer or a bit harder than they might if they had to leave campus for food or go home to sleep. Following Thaler and Sunstein's praise for the urinals at Schiphol Airport, Google placed coding tips and puzzles above urinals and on bathroom stall doors as a "fun way" to makes sure even bathroom breaks are productive (Google Testing Blog 2007). This preference for nudging employees in Silicon Valley has also become a method for intervening in the activities of users as they navigate the choice architectures of online services.

Steering Users Towards Corporate Futures

Participatory social media first arose after the dot-com crash at the beginning of the twenty-first century, with most companies producing expensive content failing to survive (Fuller and Goffey 2012). While e-commerce has certainly not evaporated since the crash, capitalizing on user-generated content and data collected about users as they accessed online services quickly came to dominate Internet economics. At first, a few webmasters discovered that advertisers were willing to pay a small sum of money to rent small portions of their website's visual real estate for advertisements. Soon after, a web designer for Tripod.com hit upon the idea of tailoring advertisements to individual users by reading their personal homepages for clues as to what they might buy. However, after "a major car company freaked out that they'd bought a banner ad on a page that celebrated anal sex" (Zuckerman 2014), the designer came up with a piece of code which would open a separate window and run an ad in it, inventing what came to be known as the popup ad. The model was successful, and the designer, Ethan Zuckerman, made a small fortune before taking an academic position at the Massachusetts Institute of Technology's Social Media Lab (Zuckerman 2014). However, visitors were quickly annoyed by popup ads, and the largely manual process of tailoring advertisements by reading personal homepages was too costly. Alternative methods for processing large amounts of Web content and the activities of visitors conditioned the creation of Internet companies whose services are free for end users and also hugely profitable. Thus, the business model of the Internet shifted from facilitating commerce to being driven largely by surveillance.

Internet companies like Google and Facebook use Thaler and Sunstein's libertarian paternalism to design architectures which steer users towards or away from specific behaviors, but also create compelling reasons for users not to leave their services or product pages. Queries to Google's search engine returns synoptic versions of Web content, displaying nearly every usage of the entered keywords on every website Google has crawled and indexed. While users have the option of choosing to visit any website Google displays, the organization of search results by a sophisticated and proprietary algorithm allows Google to direct users towards a set of choices. According to Google's former CEO Eric Schmidt, the "perfect search engine understands exactly what you mean and gives you back exactly what you want" (Google n.d.-b, para. 1). However, Google regularly makes paternalistic interventions into search results not only by ranking them according to its "relevance" metric, but also by steering users away from offensive or objectionable content. Indeed, one of the reasons Google quickly gained prominence as a search engine was its treatment of the other great monetization of the Internet, namely pornography. What is pornography? In his study of the invention of pornography, Walter Kendrick concluded that, above all else, pornography names an argument, not a thing (Kendrick 1996). In other words, when pornography was first constituted as a category, nothing counted as pornographic until someone made the claim that a particular text, image, or performance should be considered pornography and defended that claim against competing arguments for an alternative categorization. In legal discourse, the decision to regulate or penalize the production and distribution required that this argument be made before a judge who would then make the final decision as to whether or not the object in question was pornographic (*Roth v. United States* 1957). In the most famous US obscenity ruling, *Jacobellis v. Ohio* in 1964, Chief Justice Potter Steward finally defined pornography as "I know it when I see it" (*Jacobellis v. Ohio* 1964).

In computational treatments of pornography, we might be tempted to conclude with Lawrence Lessig that in cyberspace "code is law" (Lessig 2006), putting automatic limits on how users navigate the architectures of virtual spaces. Lessig's equation of the Internet with cyberspace is problematic, but so is his equation of code with law. Law requires claims, arguments, and judges who speak the law, or juris diction. Despite an estimated 30 % of all Web traffic currently flowing to pornographic websites (Sebastian 2012), Google determines what counts as pornography using filters designed to "keep families safe on the Web," left on by default, which see images as discrete collections of pixels that can be made pornographic by contrasting the number of skin-tone colors with other colors. Too many skin-colored pixels and an image is counted by the SafeSearch filter as pornographic. Google also relies upon textual analysis, which identifies sequences of words as likely to be pornographic strings, input from users who flag search results as linking to objectionable content, and human operators who look for pornography and manually remove anything they see as pornographic from search results (Google n.d.-d). In his study of Google, Siva Vaidhyanathan concluded that "Google has always tended to degrade the status of pornography sites in response to generic or confusing search terms, thus making it less likely that one will stumble on explicit images while

rarely blocking access to such sites entirely" (Vaidhyanathan 2011, p. 14). Users still have the option of entering a pornographic website's address directly into their browser or locating the constantly changing SafeSearch settings to opt out of its filtering, but doing so requires extra effort and energy. By ridding most search results of pornography, Google encouraged users to keep using their search engine services rather than their less-filtered competitors, appealing especially to parents and office workers who might find it embarrassing to explain the presence of pornographic websites on activity logs or risk having pornography accidentally displayed on a projected screen during a presentation. Vaidhyanathan concludes that through these interventions "Google has ensured that the web is a calmer, friendlier, less controversial and frightening medium" (Vaidhyanathan 2011, p. 14). One reason Google deploys these interventions is to encourage users to choose to use their services over less regulated alternatives.

Sometimes the deliberate redirecting of users within the choice architecture of an interface is to comply with local laws or necessary to obtain a license to operate. For a time, Google searches on mainland China for "human rights" returned the prompt, "Did you mean hunan rice?" and results for recipes that use rice (Borowitz n.d.). In the USA, for example, users are directed away from materials deemed to be in violation of copyright laws, and Google has created a suite of services copyright holders can use to report potentially infringing material (Google n.d.-c). Less obvious attempts to steer user behavior include Google's recent decision to switch the trash button for an archive button in its Android handset version of Gmail, encouraging users to save their e-mails for data mining purposes, or the use of Search Engine Optimization tools, which can be used to make websites conform to Google's preferred formats and increase the visibility of specific websites. Other users can also be enlisted to help shape the choice architectures. Google account members who sign into Google services while surfing the Internet (now left on by default after signing into any Google service), are now given the ability to add or delete sites from search results and report back to Google so they can tweak the algorithm (Packowski 2009). These superusers' opinions are weighted more heavily by Google than are unregistered or signed out users, meaning what unregistered users see on Google is partially organized by other users.

Choice architectures can also be created or reformed despite the paternalistic intentions of designers. In 2004, Google launched Google Scholar, a search engine for academic publications, which worked along similar lines as its popular search engine by sorting results according to a "relevance" that Google describes as ranking documents by "weighing the full text of each document, where it was published, who it was written by, as well as how often and how recently it has been cited in other scholarly literature" (Google n.d.-a, para. 3). Putting aside the question of whether the value of scholarly literature can be measured by its number of citations or other statistical metrics, especially considering that many literatures cite texts in order to refute them, the result is that articles cited more often are ranked higher and appear before less-cited articles. When Google Scholar first rolled out, only a limited number of articles were published in online journals or accessible to Google's indexing algorithms, so it is not surprising that online articles would appear higher

than articles which have only recently been digitized or indexed. Shortly after Google Scholar was created, its results also began appearing in response to queries made on the popular Google Search site, meaning academic articles were also available to wider audiences outside the academy. Prominent articles were more likely to be read and cited by academics and users creating online content, which also served to increase their ranking on Google Scholar. By creating Google Scholar and sorting results to queries, Google has had a direct effect on what kinds of research are seen as legitimate, which get funding, and the employment of researchers. Given this array of architectures and defaults for steering users, Vaidhyanathan concludes that "overall, no single state, firm, or institution in the world has as much power over web-based activity as Google does" (Vaidhyanathan 2011, p. 14).

Recognizing that no design is neutral, and in an attempt to account for the creation of "filter bubbles" in which users only see what online services think they want to see, some have advocated for interventions that purposefully expose users to news or social connections they might otherwise have missed. Ethan Zuckerman, the inventor of the popup ad, has recently called on designers to "engineer serendipity" into their platforms. Citing Gibson's *Neuromancer* and Stephenson's *Snow Crash*, Zuckerman imagines Internet users moving through cyberspace just as they would through a physical city, sometimes coming into contact with strange people and participating in unexpected situations, and he predicts that within 10 years serendipity tools will be incorporated into most consumer technologies (Zuckerman 2013). Morozov has critiqued Zuckerman as a xenophiliac hoping to use the Internet to speed up the process by which we are forced into an imaginary cosmopolitanism of xenophilia, and argues that

> the quest for engineered serendipity can become just another excuse for Facebook and Amazon to collect more information and hone their algorithms…giving technology companies an even greater role in civic life at a time when they haven't shown any respect for the responsibilities they have already. (Morozov 2013, p. 290)

However, when seen within the context of libertarian paternalism, engineered serendipity is a method for determining both the right amount of accidental exposure to difference and a means for limiting what users can encounter. More importantly, by deploying libertarian paternalism to manage users, Internet technology companies are shaping a certain kind of user—one that is self-interested and predictable.

Pushing User Predictability

In the post-Internet world, Bentham's Panopticon, which Foucault used to explain how nineteenth century institutions individualized and disciplined citizens, has exhausted its utility. First, the proliferation of networked optical surveillance devices demonstrates that visibility is not itself sufficient for guaranteeing discipline. A cursory examination of the public webcam service Chatroulette, for example, evidences a stream of users exposing themselves and performing for the camera in ways Bentham imagined surveillance would inhibit. Chun (2008) further complicates

the application of the Panopticon to the Internet by arguing that, while the Internet enables surveillance, very little real-time surveillance happens as "computer networks 'time shift' the panoptic gaze." Furthermore, "users are not adequately isolated," as data collection operates without the need to specifically identify a user (p. 85)—or, as Robert Williams pointed out, "the data gathered on us through the new technologies did not necessarily manifest our irreducible uniqueness" but instead marks us as a mass of users about whom data can be extracted (Williams 2005, para. 30). Despite the fact that evading surveillance using encryption or masking techniques alerts data collectors and ensures the encrypted activities will be recorded (Chun 2008), one outcome of Internet surveillance and the collection of data about data (metadata or dataveillance) has been the production of post-identity users, what Deleuze called the "dividual" in his 1992 interview *Postscript on the Societies of Control* (1992). With mass data surveillance, or "dataveillance," people need not be identified with a particular biography in order to intervene in their choices or behaviors. After Zuckerman's invention, advertisers do not need to know a person or their personal homepage in order to target them with tailored ads. The "personality" databases of carefully collected and constructed biographical data by the CIA to identify treats or terrorists are being displaced by "signature" databases of metadata and social network diagrams that determine which persons can legitimately be targeted with a drone strike (Engel and Windrem 2013).

Elsewhere I have argued that, using data collection, companies like Google are able to justify their colonization of the future as they imagine what Internet they will build for the four to six billion "other" new users expected to join the global Internet in the next decade (International Telecommunication Union 2011). For example, in a Public and International Affairs colloquium at Princeton University, Google CEO Eric Schmidt declared that if he learned one thing from his time at Google it was that

> people are the same everywhere … it would be the simplest way to run the world, to recognize that the other people, other races, other cultures, people who don't speak the same language have roughly the same things that they care about as you do. We know this because we can prove it. (*Princeton Colloquium* 2009)

Rather than ask what future users might need from their Internet, or invite these "others" into the process of designing the future Internet, data collection represents user preferences and, as a proven interpreter of data, Google empowers itself to represent users' interests. Despite recently arguing that an appropriate response might be a collective "withdrawal" from "the digital" (Galloway 2014), which is not so much a Luddite argument against technology as a refusal to engage in philosophy, Alexander Galloway earlier pointed out that the question posed by Gayatri Chakravorty Spivak in her famous 1988 essay "Can the Subaltern Speak?" (Spivak 1988) is being displaced by techniques which require that all bodies speak. As Galloway puts it:

> Making a phone call from the slums of Cairo or Mumbai or Paris, the subaltern "speaks" into a database—just as much as I do when I pick up the phone. The difference for difference is no longer actual, it is technical. The subaltern speaks, and somewhere an algorithm listens. (Galloway 2012, p. 137)

These changed conditions are not simply the result of new forms of Internet-connected surveillance, in which the subjection of the individual to the gaze of a centralized authority is replaced by the surveillance of everyone by everyone else, but are better understood as a result of the "yearning for the significance of small gestures" (Fuller and Goffey 2012, p. 60) and to make users predictable without also needing to impress upon users the burden of responsibility for their behaviors. In Nietzsche's genealogy of responsibility, he argues that the conditions for punishment require humans who "ordain the future in advance" by first learning

> to distinguish necessary events from chance ones, to think causally, to see and anticipate distant eventualities as if they belonged to the present, to decide with certainty what is the goal and the means to it, and in general be able to be calculable and compute. (Nietzsche 2000, p. 494)

Now the burden of responsibility has shifted away from humans who must make themselves calculable and regular, so as to be capable of making promises in a future they cannot control, to systems that treat people and things as bearers of regular expressions from which predictability can be extracted (Fuller and Goffey 2012). The business model of the Internet began as surveillance, but data collection and choice architecture has necessitated the creation of techniques for indirectly shaping users into predictable selves. Mining user data has been an effective means of predicting what users will buy or which candidates they will vote for, but the welding of users to their data and metadata also increasingly determines what they see using online services. Facebook's need to keep users on their site, in order to collect data about their preferences and generate revenue by showing tailored advertisements, encourages Facebook to revise its choice architecture based upon what the data about users predicts will encourage them to stay or leave Facebook's webpage. Mathew Fuller and Andrew Goffey have called this a strategy which mobilizes irritability, providing an outlet and capitalizing on "Nervousness, time wasting, irritation, the ability to draw out or to dither the moment when unwanted but obligatory activities start, to combine idleness with something partially purposive…turning lives of clickwork into a yield" (Fuller and Goffey 2012, p. 67). At the same time, nudging only works if users behave in predictable ways, even if occasionally the nudge must be more firm than gentle in getting users to do what is expected of them.

Thaler and Sunstein begin *Nudge* by reaffirming that people act according to their own rational self-interest, even if they sometimes do not have the information or motivation necessary to make good decisions. However, as Morozov argues, this presumption also influences how choice architectures are constructed, as architects who "believe that self-interest is the only option available… will shape social and legal institutions accordingly" (Morozov 2013, p. 199), thus nudging users to behave in self-interested ways. Whether or not people are primarily motivated by rational self-interest, a primary reason why rational self-interest became a popular explanation for behavior in social sciences was that the theory lent itself to methods of computational modeling which could make predictions about the future behavior of rational and self-interested individuals. These presumptions and models have

been criticized for ignoring how forces like the conditions of modern capitalism shape self-interest (Foley 2003) or how neuroscience has complicated the idea of rationality and a "self" responsible for determining its interests (Connolly 2002). However, the idea that human behavior, rational or not, and self-interested or not, can be predicted by computational treatments of past behaviors underlies both the business model of surveillance and the securitization of the Internet. If surveillance and data collection can predict some behaviors, and choice architectures can make other behaviors more predictable, then the need to make users predictable is a dominant driver of Internet futures and the use of data to represent user preferences becomes a useful strategy for denying the eligibility of users to create or implement alternatives.

Pushing a Neoliberal Internet Future

Following revelations that the US National Security Agency had created a clandestine antiterrorism program called PRISM, which conducted mass electronic surveillance using the Internet, international groups and governments began calling for the USA to relinquish its administration of the Internet's root, a database containing lists of all Internet names and addresses, and its stewardship of the Internet's domain name system (DNS). Currently, the root and DNS are controlled by the US Commerce Department's National Telecommunications and Information Administration (NTIA) and administered through a nonprofit corporation located in California called the Internet Corporation for Assigned Names and Numbers (ICANN). As a response to calls for a change in the administration of the root and DNS, in March 2014, the NTIA announced its intent "to transition key Internet domain name functions to the global multistakeholder community" and called upon ICANN "to convene global stakeholders to develop a proposal to transition" (Office of Public Affairs 2014, para. 1). As a first step, ICANN formed a committee of prominent Internet engineers and policymakers, chaired by ICANN President Toomas Ilves of Estonia and vice-chaired by Vice President and "Chief Internet Evangelist" for Google Vint Cerf, to draft a "High-Level Panel" report on general principles for a multistakeholder Internet governance model. ICANN also dispersed funding for Internet governance research projects to several groups, including the well-known Berkman Center for Internet and Society at Harvard University.

In the summer of 2014, I was invited to participate in the Berkman Center's ICANN-sponsored "Internet Governance Project," which was tasked with coordinating a collaborative effort of more than 20 universities to provide empirical research in support of multistakeholder models of governance which might be applied to the Internet. The details of the project are less important than the trend towards multistakeholder governance which has been championed by the US government, Internet companies, and policymakers. Multistakeholderism, a term which first appeared in business journals and popular presses along with calls for corporate social responsibility in the 1960s, is defined by the High-Level Panel Report as a

type of governance which is "democratic…ensuring the meaningful and accountable participation of all stakeholders, including governments, the private sector, civil society, the technical community, the academic community and users" (ICANN Panel on Global Internet Cooperation and Governance Mechanisms 2014, p. 34). In this scheme, stakeholders are considered to be equal members who collaborate and deliberate in a democratic fashion until a consensus is reached on how to deal with a specific issue or decide a course of action.

Proponents of multistakeholder models argue that the decentralized and collaborative nature of the Internet should be administered by a decentralized and collaborative system of governance. However, missing from much of the debate on multistakeholder Internet governance are the political questions of who counts as a stakeholder and who decides who counts, ignoring how multistakeholder projects are often initiated at the request or command of governments. In a coauthored paper published just before the High-Level Panel Report, for example, Vint Cerf argued that multistakeholderism "also means governments have an equal voice with others in the community, like businesses, academics, and civil society" (Cerf et al. 2013, p. 14). The idea that governments and businesses "have an equal voice" is less a statement of equality and more a statement about the proper role of governments in a globalized and neoliberal market economy. The imagined decentralized, and anti-hierarchical, organization of the Internet becomes a neoliberal model of governance where the light touch of governance displaces the "commands, requirements, and prohibitions" of governments (Thaler and Sunstein 2008, p. 10). In this neoliberal interpretation of Internet governance, "governance" means little more than "not governed by governments," or as Thaler and Sunstein put it, "*we are not for bigger government, just for better governance*" [original emphasis] (Thaler and Sunstein 2008, p. 14). This preference for not-government-governance also helps explain why the quasi-authoritarian governments of China and Russia have been largely excluded from the resulting models and the citizen-users of those countries, despite having more users than the rest of the world combined, are marginalized as architects of the Internet's future.

The push for multistakeholder models of future Internet governance cannot only be understood in terms of neoliberal fantasies about rational markets. The decision to form the High Level Panel, the creation of their model, and the need to have Harvard stamp the model with its seal of approval is a gamble which hopes to provide an alternative to the voices calling for governmental administration of the Internet. This drama occurs against the backdrop of fears over Internet fragmentation, or the breaking up of the Internet into several national or local internets, often termed "Internet Balkanization" or "Splinternets" (Crews 2001, para. 4). Dissent over how to govern by the International Telecommunication Union, the USA, Brazil, Iran, Russia, India, China, Turkey, and members of the European Union is thought to threaten the unity of the Internet and create disparities of access between regions of the world. We see another past image of the future directing the debate, as the Internet is thought of as the realization of Marshal McLuhan's global village. The use of the term "Balkanization" imagines a globally unified network devolving into petty tribalisms of barbarians (Alves 2014). This conservative view of Internet

governance hopes to preserve "the Internet" by keeping it the way it never was; a unified whole. Most Internet users access very little of the Internet or use only a handful of preferred services, but other factors deny this unity, including differences in bandwidth, technical protocols, content locked behind pay walls, Virtual Private Networks, filters and interface ranking systems, interruptions and optimizations to packet routing, and a myriad of fragmentations between networks and services. Multistakeholder models, where states are made equal to other stakeholders, seem like the only way to keep parochial national concerns from fragmenting a global Internet.

In our examination of various multistakeholder models at the Berkman Center, it quickly became clear that most governance structures which called themselves multistakeholder were not democratic or egalitarian. Many were convened, primarily funded, or provided administrative support by governments such as the Swiss Federal Communications Commission round table and the Enquete Commission of Germany, which created policy backed by state law. These organizations much more closely resemble oligarchical rather than democratic forms of decision-making, often intentionally not including competitors or dissenting voices as stakeholders in their structure. Other multistakeholder bodies were partially administered by states, like the White Volta Basin Board in Northern Ghana, which is tasked with implementing decentralized water resources management, but "largely exists on paper only" (Ofosu 2011, pp. 31–32). While there have been some successful multistakeholder decision-making bodies, such as the statement of principles drafted by the NETmundial Initiative in Brazil at the "Global Multistakeholder Meeting on the Future of Internet Governance" in 2014, it is clear that their success is aided by governments, which play a dominant role in the creation, administration, funding, and legal backing of multistakeholder governance modes. Why, then, is there such an effort to make the role of governments invisible?

According to William Connolly, neoliberalism is motivated by a desire to circumvent or replace the dysfunction of electoral politics with the simplicity of self-organizing markets capable of making rational self-adjustments, not unlike Wiener's theory of cybernetics. Neoliberalism "treats the state as necessarily clumsy and inept by comparison to a singular, utopian image of markets" (Connolly 2013, p. 31), much as Barlow's declaration describes states as "weary giants of flesh and steel," (Barlow 1996). As Morozov puts it:

> geeks are impatient with politics because they think that it involves nothing but talk. For them, deliberation is the cancer in the body of modern democracy, and it would be so much more productive to replace talk with action, with doing things, for all this chatter is of little to no use. (Morozov 2013, p. 133)

One way to circumvent or hack politics is to resort to sabotage tactics, like defunding or dismantling state-sponsored alternatives "to *make* politics dysfunctional to make people lose confidence in it and to transfer their confidence to the private sector" (Connolly 2013, p. 182). Vaidhyanathan points out that attempts to equate the Internet with the science fiction images of cyberspace conditioned the possibility for those creating Internet governance models to assume states and policy makers are too slow to keep up with the "console cowboys" or hackers who

innovate their way around governmental interference. When the state does appear in Gibson's *Neuromancer* (1986) or Stephenson's *Snow Crash* (2000), it appears as just another player in the globalized real world, or another voice in the virtual one. When viewed from this perspective, recent experiments with multistakeholder governance may be seen as strategic methods for encouraging popular support for apparently democratic decision-making processes that bypass the dysfunction of electoral politics, or are useful for demonstrating the ineffectiveness of governments, to justify transferring authority to private actors. The failures of defunded universities and libraries, for example, demonstrate how much better Google is at sorting knowledge and doing so without imposing a burden on taxpayers. Governments are told to keep their hands off rational markets, but making sure the hand guiding markets remains invisible can now be aided with the invention of new technologies of visibility. The ability to peer behind digital interfaces or programs and see the underlying code which organizes them resonates with the American distrust of government and makes "transparency" or "openness" seem like a powerful new tool for holding governments accountable. The "Transparency Reports" issued by Google, Facebook, and Twitter show how many times they have received takedown requests from governments, on data rich interfaces, without showing how decisions were made about the requests or who made them. As Morozov puts it, "'open government' might just be a euphemism for 'small government'" (Morozov 2013, p. 97), but we could also add that a transparent neoliberal system of governance would be invisible.

Those pushing for multistakeholder models of future Internet governance might also consider Connolly's re-reading of Fredrick von Hayek's *The Road to Serfdom* (2007) in the context of neoliberalism where the

> danger of 'serfdom' today, you might say, is the emergence of a regime in which a few corporate overlords monopolize creativity to sustain a bankrupt way of life…to cling to American hegemony in a world unfavorable to it…in which the ideology of freedom is winnowed to a set of consumer choices between preset options. (Connolly 2013, p. 79)

The coerciveness of defaults and libertarian paternalism has an enormous influence on the futures of the Internet, as "pressures on many in the lower middle class to identify with the vision of the future publicized by those above them" and alternative visions of the future are reduced by choice architectures where users must "either embrace the system with fervor, withdraw as much as possible from it, or wait for an explosion that changes everything rapidly" (Connolly 2013, p. 189). So the question concerning Internet governance seems to be, to borrow from Latour, "Which tyrant do you prefer? The one with the invisible hand of the markets, or the one with the visible hand of the State?" (Latour 2013, p. 468). ICANN's High Level Panel has tried to devise a model which serves two tyrants, inviting both to govern the Internet without even imagining, as Latour writes, "there might be no hand at all!" (Latour 2013, p. 469). There are numerous alternatives for the future of Internet governance based upon anarchist, Marxist, egalitarian, or nonhuman models for decision making, such as the direct democracy of swarming bees deciding the location for a new hive (Seeley 2010). By framing it as a choice either between rational markets represented by the private sector or national governments bent on

Balkanization, they hope to colonize the futures and deny the political eligibility of different designs and different designers. The present might be unsalvageable, but the futures are open to alternatives.

Alternative Internets: Dispatches from the Future

The Free Internet

Driving Factors:
In this scenario, the primacy of economics and commercial interests shape the Internet into a centralized network of services administered by a handful of technology companies.

Narrative:
Keynote Address by Dr. Donald Hadoop to the 2045 iGovernance Coalition Stakeholder Convention

Some of you here are old enough to remember how complicated and inefficient it was to use the Internet. In the early 2010s, people had to use several separate devices and several online services just satisfy even the most basic needs of digital life. In 2017, for example, in the USA there were four Internet Service Providers, all providing access to the same Internet, and three social media platforms that provided the same services. Thankfully, these redundancies were resolved with the IT mergers of the early 2020s as GooFace erased the difference between Internet access and Internet services. The devices we used were clunky, power hungry, made out of toxic minerals, and had to be constantly updated. We used to store our data on physical media which could be lost or damaged. This was before the Deletion Criminality Agreement, and the amount of data we could store was only a fraction of what we needed to have an accurate record of our experiences. Without GooFace's prescient construction of the Green Cloud, the environmental costs of all these different devices and services would have made our current fossil fuel shortage far more severe. It can be hard for younger people to imagine life before the seamlessly integrated and tethered Ubiq system we use and love today, but the Internet of my youth was wasteful and messy. The Internet freedoms young people see as a right were then only a dream.

You did not bring me here to give you a history lesson of the Internet, but I cannot speak today about Internet freedom without recognizing the role our iGovernance Coalition (iGC) has provided. First, if GooFace did not provide us with a license to their proprietary Mnr software package, we would not be able to fulfill our mandate to democratically extract the wishes of our netizen stakeholders without burdening them with inefficient questionnaires or electing corruptible delegates to represent them. In the early 2020s iGC was a relatively small player until growing threats to Internet unity by governments required us to take a more active role. Thanks to the iGC tirelessly working behind the scenes, nudging netizen support away from the xenophobic state policies against foreign "Internet creep," the Treaty

of Cyberillas granted Transcend Holdings exclusive rights to Afro-Asian cyberspaces and GooFace rights to Euro-India cyberspace without breaking the Internet into pieces. Now netizens in Accra, Pingdingshan, and Detroit all have access to free services, like Zuckerberg University and the Ma Lab for Online Innovation, without governments deciding what they can or cannot see, say, and do in cyberspace.

The iGC has done more for Internet Freedom than just keep governments censors at bay. While early Internet companies figured out how to provide their services free of charge by gathering donations or gathering netizen data, the Net Neutrality policies drafted by the iGC have enabled GooFace and Transcend to provide free Internet access to every human being on the planet. Under iGC's successful Net Neutrality policies, GooFace does not discriminate against netizens accessing Transcend's suite of services, and Transcend netizens are free to access GooFace's services without interference. Net Neutrality guarantees the freedom of netizens against interference from competitors and governments, but the exchange of access for netizen data also makes the Internet truly free from discrimination based upon ability to pay. No longer are netizens in poor parts of the world excluded from our global village and no longer are they robbed of the dignity of work because they are too far from the economic heart of our Internet society. While some netizens are able to purchase privacy and call our current system of Internet governance a return to feudalism, the Deletion Criminality Agreement guarantees that every netizen's data will eventually be open to Mnr and every netizen is free to leave cyberspace anytime they wish. Thanks to the iGC, netizens and corporate persons alike enjoy true Internet freedom.

The Safety Net

Driving Factors:
In this scenario, cybersecurity and the early detection of threats takes precedence, but most Internet users have accepted the need for surveillance, and governments rely upon Internet technology companies to collect most metadata.

Narrative:
2045 Annual Threat Evaluation from GATSA Director ADM Noah Allh to EVEY Partners. CLASSIFIED.

The communications intelligence activities of the Global Anti-Terror Security Agency (GATSA) are a multinational responsibility. They must be organized and managed so as to exploit the maximum available resources in all participating agencies of the Eleven Eyes (EVEY) alliance. GATSA network penetration tests from our Beijing office have discovered the presence of Digital Noise Generators confusing dataveillance operations near the New Zealand Internet exchange point (IXP). Following GATSA regulations, IsoBots were immediately dispatched to filter noise at the affected nodes and attempt to reconstruct the data lost in the IXP metastream.

In accordance with the EVEY Agreement of 2019, GATSA requests metadata records from all human and nonhuman Internet activity to be routed through the New Zealand IXP from EVEY alliance agencies in the European Union, the Russian

Cartel, China, Israel, and India. As you know, following the fossil fuel shortages of the early 2030s and subsequent de-lectrification attacks on Silicon Valley by climate fundamentalists, GATSA confiscated all server farms and centralized their operations at the Mauna Loa Geothermal Plant, where all data storage and processing can be monitored. At approximately 13:32:45 on 05/03/45 the GATSA Cloud on the Big Island of Hawaii reported data holes indicating that there may be an air-gapped device somewhere in New Zealand. Additionally, GATSA's Packet Tasting Department reported sporadic transmissions of unencrypted data across the transport layer over the past 3 days. This activity is unusual, since the 2033 Internet Freedom treaty required that all devices tethered to the GATSA Cloud, which as of 2036 includes every registered Internet device on the planet, be freed from the virus- and bot-infested transport layer with hardcoded encryption for GATSA's Virtual Private Network.

Based upon these indicators, our Terrorist Signature Algorithm (TSA) has assigned an 87 % probability that the suspicious, unencrypted data being sent across the transport layer is being sent by the same gapped device producing data holes in the GATSA Cloud and that the deployment of noise generators may have been an attempt to confuse GATSA analytics. The use of a gapped device and the transmission of unencrypted data constitute a Class C act of TerrHacking, under the Hacking is Terror clause of the EVEY Agreement, and the TSA has provided signature profiles of 16 first-order social networks from which the act of terrorism is being conducted. Anti-Cyberterrorism Architects are devising a reconfiguration plan for these first-order social networks and are confident they will be able to guide users within these networks to identify the TerrHacker(s) or encourage the terrorist(s) to turn themselves in to local cybersecurity officials. Given the nature of these potential attacks, Tel Aviv University's Cyberarms Research Centre and the US private security contractor DarkBits have both requested that any member agency of the EVEY alliance that apprehends this unknown TerrHacker or TerrHackers grant their representatives First Right of Recruitment before formal Class C charges are filed. GATSA requests any metadata related to these events be shared with the TSA for use in improving our terrorism prediction models, and we will share the results of our metadata analytics on the New Zealand events with our EVEY partners as soon as the TerrHacker(s) are taken offline.

Erratic Internets

Driving Factors:
In this scenario, shortages of cheap energy require governments to regulate the Internet as a scarce resource which creates temporal Internet fragmentation as alternative communication methods and compression techniques create erratic data transmission rates worldwide.

Narrative:
Message from Internet Energy Specialist Philip Spirit, Japan IXP, to Deandra Spirit, EU IXP. 01/06/2045

Dear Dee,

I hope this message makes it to you before your 14th birthday, but since personal messages are usually lower priority and it is wintertime here in Japan, it takes longer for the Data Buffer capacitors to store up enough energy for our transmission bursts to Europe than you're used to. The Japanese were so quick to dismantle their nuclear power plants after the Fukushima disaster that it has been hard keeping this island synchronized with the rest of the global Internet once it became too expensive to extract fossil fuels in the 2030s. I wanted to send you a video of the workers at the Crowd Computing offices we've setup to manually decompress the Internet data Japan receives, but the local Electronic Efficiency Officer told me the picture would take up too much room and he deleted it. I heard rumors that the Vietnamese Government has been censoring online protesters using the excuse that their dissent wastes electricity, so I guess I shouldn't complain too much about the EOff deleting my video recording.

Can you believe that people used to take pictures of their food and share them online or that your grandmother didn't have to share her connection with thousands of people and actually used to "stream" videos instead of keeping a physical copy? Using the Internet was so easy back then. Grandma once told me people were so convinced they should be allowed to be this wasteful that they protested any time someone tried to limit how much bandwidth they used. One of the other Internet Energy Specialists here, Ma Yun, told me the Chinese Internet is pretty reliable because, even when the rolling blackouts knock people offline, they send files to each other using the postal service. That's not a bad idea, but when people started realizing how much electricity the Internet and all our devices used, I remember some countries experimented with sending big packets of data stored on media to each other to stay in sync. They eventually gave up because it was too hard to coordinate. Besides, once governments started nationalizing Internet Service Providers and online services, it was easier just to let them connect to the internets of other countries on a schedule while we just synced up with our state Internet.

I told Ma about the EOff deleting my video, and he was nice enough to let me use some of his storage media. I was surprised when he told me that data storage wasn't as big a deal in China since people from the USA and Europe had been sending their garbage to China for decades, so there are plenty of old devices and media laying around for anyone who knows how to make them work without using too much power. I'll try to make another video of the Crowd Computing office and keep it on Ma's media so I can send it to you when I'm in the U.S. next week helping the Silicon Valley Cartel setup their own Crowd Computing project. Internet scarcity is just as much a problem there as it is anywhere, and they'll probably charge me a lot to send a priority message with a video attachment, but it's worth it if you get the message faster next time. If your brother can take a picture of you blowing out your birthday candles and there's room in your next Internet Ration, send it to me so I can pretend I was there. Happy birthday and I hope to hear from you soon.

With love,
Dad

Conclusion: After the Internet

The Internet has become such a fixture in our imaginations that we may have an easier time imagining the end of life than imagining life after the Internet. This chapter demonstrates how past visions of the Internet as cyberspace, a libertarian space beyond the reach of governments, a global village, and an economic marketplace have shaped both the organization of the Internet and how we imagine its futures. The dominant drivers pushing the Internet's future, especially the use of surveillance to monetize or secure the Internet, also help determine the eligibility of different actors hoping to reshape the Internet and its users. The three alternative scenarios presented here extend these trends into the future, presenting both the perils and promises the Internet might bring over the next 30 years. Certain global trends are inextricably linked to the future of the Internet, such as the very real challenges we will face as fossil fuels become harder to extract and the electronics we take for granted today become more costly to operate. Many images of the Internet's future, like those given by Lessig, Zittrain, and Schmidt and Cohen, admit that most future users will not be American, and yet they often unquestionably project American Internet values on the billions they see soon joining the global Internet. Ron Deibert has recently called this a "Western conceit" and points out that "The Internet may have been born in Silicon Valley or Cambridge, Massachusetts, but its destiny lies in Shanghai, Delhi, and the streets of Rio de Janeiro, the places where its next billion users are going to come from" (Deibert 2014, p. 14). The three scenarios presented above attempted to account for those differences, but the challenge of imagining what users from diverse regions and cultures will want from their Internet is difficult—even if data collection tempts us into making universalist claims.

However, as this chapter has shown, how we think and talk about the Internet's future is intimately tied to which features of it we build, alter, and preserve. There are elements of the three scenarios presented above which are preferable, and elements to be avoided, as we build our Internet's futures. Both the Free Internet and Safety Net scenarios include centralized computing and data storage for efficiency purposes, but the third scenario's treatment of the Internet as a scarce resource uses strategies other than centralization to make internets less wasteful and considers Internet fragmentation as potentially beneficial. The use of terms like freedom, democracy, and representation are all terms associated with the neoliberal capitalization of the Internet in the Free Internet scenario in ways we might not prefer. The Safety Net scenario extends security claims we see today, like the FBI's classification of hacking and hacktivism as both illegal (Deibert 2014), into a future in which all attempts to experiment with secured technologies are treated as terrorism. Cybersecurity specialists and counter-terrorist organizations might prefer a future which justifies their extraction of fees from clients, but to those who consider hacking a useful technique for challenging arbitrary power or testing alternative uses of increasingly closed devices this future is chilling. The overt intervention of authority in the Erratic Internet scenario might be preferable to the paternalistic nudging

interventions of the governors in the Free Internet scenario or security agencies in the Safety Net scenario if we value the ability to question or confront authority even if it is sometimes a burden.

This chapter raises several questions, some of which remain unanswered, including: Is the Internet we have durable enough to survive in the long term? Which parts are worth preserving, and which parts are preventing the futures we prefer? Are the collection of Internet services we currently use, increasingly managed by private monopolies, serving our interests and the interests of future generations? The most important questions are not whether there is such a thing as "the Internet," or if it has a future, but whether the systems we have now are the best we can do and if those we have empowered to design our futures represent our interests. Answering these questions requires us to not only think about which future we prefer for our Internet, but also to think about the futures after the Internet. One day powerful Internet companies and their services will die or be replaced. One day the Internet will die or be replaced. One day the Internet's current users will be dead and replaced. The best way to prepare for a world after the Internet is to build systems which can better serve us and future generations, regardless of which technologies and companies flourish in the coming decades.

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Chapter 3
Futures of Participation and Civic Engagement within Virtual Environments

Mario Guilló

Information Society

Since Touraine (1971) and Bell (1973) posed the existence of a structural change in industrial capitalist society more than four decades ago, there has been speculation about a new model of society labeled with a number of different denominations, including *Post-industrial Society* (Touraine 1971; Bell 1973), *Risk Society* (Beck 2006), *Liquid Modernity* (Bauman 2003), and the *Network Society* (Castells 2005). According to Bell (1973), the Post-industrial Society represents a major change from its predecessor: production becomes less important compared to services, and information, knowledge, and research and development become the new key social elements. Meanwhile, negative consequences of the Post-industrial Society have been highlighted by Touraine (1971), who states that "it is a society of alienation, not because it reduces people to misery or because it imposes police restriction, but because it seduces, manipulates, and enforces conformism" (p. 9). Bauman (2003) refers to this new society as liquid, in the sense that the traditional "solid" social structures (government, institutions, companies, relationships) have become constantly changing entities.

All these interpretations have something in common: the essential role directly or indirectly assigned to information and knowledge (as well as to the technologies associated with them) as key factors to boost development and welfare within this new society. Castells (2005) names this new reality the Network Society, noting that the core of the transformation experienced by us in this ongoing revolution refers to information and communication technologies (ICTs). ICT is to this revolution what energy sources were to the previous industrial revolution, *informationalism* being the basic pillar of this society. The concept of informationalism is based on the

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assumption that the decisive activities in every field of human praxis rely on information technology, organized (globally) around informational networks that have information processes as their core (Castells and Himanen 2002).

For Castells (2006), "informationalism differs from previous technological paradigms in relation to the development of information and communication technologies (printing, telegraph or the non-digital phone, amongst others)" (p. 34). And these differences are closely related to three fundamental and distinctive characteristics of core technologies within the system:

1. Self-expanding processing capacity and communications in terms of volume, complexity, and speed.
2. Ability to recombine based on digitization and recurrent communication.
3. Flexibility in distribution through digitized and interactive networks.

The appearance of this new technological paradigm during the 1970s, together with the industrial crisis (and its classical production models), plus the cultural and social liberation movements, made possible the rise of the Network Society. Castells (2005) defines this as:

> one whose social structure is made up of networks powered by information and communication technologies based on microelectronics. Speaking of social structure here refers to those human organizational arrangements related to production, consumption, reproduction, experience and power, expressed through meaningful communication codified by culture. (p. 27)

In view of the statement made by Castells, the development both of the Internet and of all the technologies related to it arguably plays a critical role when it comes to understanding how the Network Society's social structure is shaped. In other words, talking about the future of the Internet means talking about the future of social life and its interactions within various socioeconomic, political, and cultural contexts.

Evolution of the Internet

ARPANET—born in 1969—is considered the predecessor of the modern Internet, and it was initially composed of four networked computers that allowed for the exchange of information packets between them. This idea of online computers continued to develop during the 1970s and 1980s, but its use continued to be confined to a small minority. It was the advent of the World Wide Web and the extensive use of hypertext as a user interface paradigm that led to Internet access democratization. The first stage of the World Wide Web evolution is referred to as Web 1.0 (1993–2001). Users could access content on websites but could not contribute their own content. Thus, Web 1.0 presented a scenario where most users simply acted as content consumers (Krishnamurthy and Cormode 2008).

The following stage of the World Wide Web was dubbed Web 2.0, a term first coined by DiNucci (1999) and years later popularized by O'Reilly (2005), which

refers to a new dominant form of interaction between people through different Internet-connected devices. The Web 2.0 paradigm represents a quantum change linked to the appearance and development of flexible environments characterized by a collaborative and interactive approach where users become contributors, publishing information and changing data at their convenience. This change marks the passage from a user with simple access to information to one who has the power to issue and modify that information; or expressed differently, Internet users evolve from mere spectators to active participants within this new virtual environment. The development of Web 2.0 consequently generated a huge variety of possibilities to create networks of individuals and organizations with common interests.

The Rise of Social Networks

Social networking sites, emerging in tandem with Web 2.0, have been the best catalyst for widespread user participation. boyd and Ellison (2007) define them as:

> web-based services that allow individuals to 1) construct a public or semi-public profile within a bounded system; 2) articulate a list of other users with whom they share a connection; and 3) view and traverse their list of connections and those made by others within the system. (p. 211)

The Global Digital Statistics Report (We Are Social 2014) shows that, in 2014, 26 % of the world's population was connected to social networks. Compared with a 35–37.9 % global penetration rate for the Internet (We Are Social 2014; Internet Society 2014), we have a clearer idea about the importance that social networks have for Internet users. Other figures show that 75 % of the Internet population worldwide uses social networking sites for 2 h per day on average (We Are Social 2014)—actively using 2.82 social media platforms, even though the average number of social profiles per Internet user amounts to 5.86 (Global Web Index 2014). In other words, today's society is facing a global reality where the Internet and social media sites have already become a global and rapidly growing phenomenon.

The distribution of Internet users across regions is still very unbalanced. The Pew Research Center (2015) reports that 87 % of adults use the Internet in the United States, but this rate is very low in some of the world's most heavily populated developing countries, including India (20 %), Bangladesh (11 %), and Pakistan (8 %). The Pew Research Center also highlights the strong correlation existing between per capita income and Internet usage.

Thus, a future challenge is bridging the penetration gap among world regions. Not only economic and demographic factors, but also cultural and political ones need to be taken into account in this regard. The Pew Research Center reports that majority of people in developing countries consider the Internet to have a positive influence in some social contexts (especially in education) but a negative one in others (morality, for instance). This hinders efforts to boost Internet penetration in developing regions to a considerable extent: moral values in some developing countries are deeply rooted in the traditional structures of social, economic, and political

power. Since the Internet can challenge and shape these structures and create new ones, the status quo will likely enforce negative ideas about the influence exerted by the Internet. In other words, it is not sufficient to overcome the economic and technological barriers to increase Internet penetration at a quantitative level; it will also be necessary to foster a cultural and political shift in those countries where the Internet has been censored on the basis of negative images. So, in those countries, a major challenge is dealing with cultural and political barriers against the transforming power of Internet, in an attempt to avoid the censorship coming from traditional structures of power, thus making it possible for Internet penetration to increase in qualitative terms, too.

Apart from the aforementioned global penetration gap between regions, it could be said that the Network Society is largely comprised of individuals and organizations that, in one way or another, are consuming information and producing (or reproducing) it in the online world. However, these general figures do not reflect the various types of interaction that are taking place inside these networks—an issue that will be addressed later in this chapter.

Drawing a comparison between Web 1.0 and Web 2.0 principles enables us to state that the irruption of social networks has led Internet users to become part of global networks connected through virtual environments that allow them to integrate into large online communities. This willingness to be integrated into virtual and global communities and to become active in the content generation process, combined with the technological potential of Web 2.0, has largely favored the rise of *collective intelligence* (Surowiecki 2005). Collective intelligence was first described by Lévy (2000) as:

> a form of universally distributed intelligence, constantly enhanced, coordinated in real time, and resulting in the effective mobilization of skills … The basis and goal of collective intelligence is mutual recognition and enrichment of individuals rather than the cult of fetishized or hypostatized communities. (p. 13)

If the introduction of the Internet and subsequent virtual communication tools meant a qualitative breakthrough that forever changed how people would communicate with one another as well as with organizations and institutions, the degree of interactivity allowed and encouraged by Web 2.0 represented a giant step in collective intelligence development. That is why this new social reality appears as a perfect scenario for civic renewal, increasing citizens' active role in social life through a boost to civic engagement supported by the enormous potential offered by social networking sites.

Participation and Civic Engagement Within Social Networks

It was explained above that the irruption of Web 2.0 and social networks has opened a wide range of possibilities to create new ways of participation and engagement amongst citizens. However, the availability of technology is not enough, and the occurrence of certain civic and political movements becomes essential.

A set of social movements occurring around the globe during the past several years has something in common in terms of the promoters of change (citizens) and the channels that they have used to pursue their objectives (Internet and social networks). Most of these examples (e.g., Arab Spring, Icelandic revolution, 11-M movement, Occupy Wall Street) originally had a regional scope. Their impacts have quickly become global, however, since we are living in the Network Society (Castells 2012). These examples illustrate how a massive participation oriented towards a common goal can be successful by using the Internet as a supportive tool. Various kinds of participation and engagement processes that are taking place right now, however, must be analyzed in order to visualize future scenarios for virtual participation and civic engagement.

On the one hand, some authors have shown their skepticism about the role played by the Internet in the renewal and development of civic participation (e.g., Park and Perry 2008; Livingstone et al. 2007), addressing some of the negative points shown by this new reality (e.g., digital divide, isolation) and sometimes being very critical of techno-enthusiasm (e.g., Selwyn 2004). On the contrary, trying to approach this issue in a more empirical way, and taking as their reference Facebook, Sabatini and Sarracino (2014) conclude that "the online networking revolution is allowing the Internet to support – rather than destroy – sociability and face-to-face interactions" (p. 35), thereby stressing the capacity of social networks to boost civic engagement. The *2nd annual poll on how personal technology is changing our lives* (conducted by Microsoft) shows that Internet users strongly agree about the positive impact of the Internet on social activism:

> respondents from all the countries agreed that social media have had a positive impact on social activism, with some concerns emerging especially in developed countries such as France, the US, and Germany. Developing countries remain enthusiastic about technology opening up political expression, but their enthusiasm was more tempered this year [2014]. (Penn 2015, para. 3)

In our opinion, what was stated above clearly reflects the current situation with regard to this discussion: it could be said that the main speech still remains techno-enthusiastic, partly supported by the empirical data that show a growing number of people joining social networks and reinforcing their social links (Penn 2015). However, many questions have arisen in recent years about how the Internet is transforming and boosting our social interactions, and most of them still remain unanswered.

The discussion on how the Internet and social media could affect civic engagement requires conceptualizing participation in a multidimensional way, and this requires taking into account not only different types of communities focused on different topics (politics, economics, culture, etc.), but also different frameworks of reference (local, regional, national, supranational), both in physical and virtual environments. Adler and Goggin (2005) define civic engagement, as "the ways in which citizens participate in the life of a community in order to improve conditions for others or to help shape the community's future" (p. 236). This definition does not present the nature of a community in local/regional terms, giving us space to develop

a broader context for what can be understood as community life and community futures. In turn, Brandtzæg et al. (2012) define civic engagement in social media as "action in response to societal needs, in the form of supportive, deliberative, and collaborative practices in social media" (p. 67). This clearly allows us to appreciate how the reference framework has changed from community needs to societal needs, thus highlighting the global nature of our society.

Furthermore, it is our conviction that a multidimensional approach to civic engagement needs to be reinforced so that the rise of alternative ways of participation/engagement can be fully understood. In this sense, "talking about action in societal needs" makes us realize how important it is to pay attention not only to our role as citizens and voters but also to our role as consumers demanding responsible actions from firms. In fact, the growing interest of firms towards social corporate responsibility issues constitutes a good indicator for the increasing number of such consumers. According to Nielsen (2014), 55 % of global online consumers say that they are willing to pay more for products and services provided by companies that are committed to the achievement of positive social and environmental impacts. Those are signs showing a growing interest by different social actors interested in participating in civic actions and movements aiming to face major social challenges.

Following Brandtzæg et al. (2012), we present three kinds of practices for civic engagement through social media, each of which may be translated into different actions and outputs. Table 3.1 provides an overview of these three kinds of practices. A more in-depth description (taking into account current and future trends) will follow later in this chapter.

Table 3.1 Types of engagement

Type of practice	Actions	Output	Attitude	Channels of participation (examples)
Supportive	Online petitions Joining Facebook groups/pages Sharing information for specific societal causes	Collective support	Passive	Online campaigning platforms Social media campaigns on Facebook, LinkedIn, Twitter, etc. Crowdfunding platforms
Deliberative	Discussing and debating purposeful societal issues	Collective intelligence	Active	Open online platforms and think tanks
Collaborative	Creating solutions collectively to solve problems in society	Collective action	Active	Crowdsourcing platforms Open innovation platforms

Source: Adapted from Brandtzæg et al. (2012)

Supportive Practices

This practice is also known as "micro-participation" (Haller 2011), and it includes support actions allowed by online platforms and social networks, especially sharing information about different social causes, movements, initiatives, etc. This emerges as the most common kind of participation amongst social network users with regard to participation, the reason possibly being the low level of commitment needed to engage in them compared to other types of participation.

A special focus also needs to be placed on visual content: The rise of platforms such as Instagram, Tumblr, and Pinterest shows the existence of a growing interest in visual content amongst social media users: according to the Global Web Index (2014), these were the fastest-growing social platforms during the second half of 2014: Tumblr (120 %), Pinterest (111 %), and Instagram (64 %). In addition, Facebook, the social network with the highest penetration level worldwide, had 1.44 billion monthly active users by the first quarter of 2015 (Statista 2014). Based on data supplied by Socialbakers.com, 87 % of total interactions took place on Facebook, and links were the second most shared content type, representing 4 % of total interactions.[1]

Attention should additionally be paid to recent trends, such as the massive sharing and following processes. Nowadays, the Internet has plenty of tools, apps, and tips to maximize the sharing efforts meant to improve both networking strategies and the online visibility of individuals and corporations. Within the current social environment, creating a wide network of followers/contacts has become a critical issue for companies and individuals (personally, as well as professionally) and, therefore, becoming a social media influencer is a common goal for the vast majority who see social networks as a great opportunity to develop their professional careers.

This has been the perfect breeding ground for the development of different reprehensible practices within the most important social networks. Let us take Twitter as an example: some illicit practices—such as buying followers in order to become a Twitter influencer (in quantitative terms)—have been reported in this social network where the number of followers (i.e., persons following the activity through tweets, retweets, mentions) of one account has become more important than the actual activity performed from this account. Even though this is a minority practice, it clearly exemplifies a phenomenon which is taking place in social media right now: some social networks are now full of people (accounts) with thousands of followers who tweet every day and never get any replies from their network members.

A striking contradiction consequently arises when network size acquires more importance than the communication processes taking place therein: networks are becoming increasingly large, but they are losing their potential as bidirectional

[1] This research was carried out in January 2014, based on the observation of the top 10 % posts made by more than 30,000 Facebook users.

communication platforms that enhance the exchange of information and the creation of meaningful connections. It also implies a change towards a new paradigm where credibility gradually loses weight in favor of networking and communication skills within the social media environment. This represents the victory of form over content, and may be explained by the fact that some of the traditional influencers are less familiar with the communication codes and practices typical of social media. One can observe a shift towards a fuzzier environment where the development of networks has become an end in itself, and where networks become more important than the actual information transmitted through them. As a result, the structure and size of those networks now have a key role in defining reality (i.e., professional and personal relevance) within the virtual world, but at the same time they could be losing their ability to boost bidirectional communication processes.

Moreover, the development of sensors and tracking technologies is creating new types of participation that prove difficult to name or tag because of their nature. Sensor technology developments are guiding us to a future where everything could be tracked, measured, and analyzed. A reference must be made at this stage to the Internet of Things (IoT) paradigm, where the basic idea is:

> the pervasive presence around us of a variety of things or objects – such as Radio-Frequency IDentification (RFID) tags, sensors, actuators, mobile phones, etc. – which are able to interact with one another and cooperate with their neighbors through unique addressing schemes to reach common goals… the main strength of the IoT idea lies in the high impact that it will have on several aspects of the everyday-life and behavior of potential users. (Atzori et al. 2010, p. 2787)

Due to the original concept being expanded over time, this paradigm has been renamed as the Internet of Everything (IoE) (Bajarin 2014): IoT developments, in combination with Body Area Networks (a system of devices in close proximity to a person's body that cooperate for the benefit of a user), could make it possible to connect information coming from all kinds of living organisms (e.g., plants, animals, humans). Thus, IoE developments can lead to new forms of passive participation; in other words, physical and/or emotional responses to any event could be automatically tracked from a person—this being understood as a way of *participation* if the monitored subjects allow third parties to access this kind of information.

Some driving forces concerning information privacy should be highlighted in relation to such IoE developments. Microsoft's second annual survey of worldwide Internet users has shown that one major concern about personal technology that nearly all Internet users share is privacy. According to this report, a majority of Internet users surveyed think personal technology has had a negative impact on privacy (Penn 2015). This concern, already reflected in the first annual poll, is now significantly higher (+5 % points), which can be partly explained by skepticism about the new IoE developments as well as recent Internet surveillance plans approved by national governments in response to different security threats, particularly recent terrorist attacks (Dearden 2015).

However, general concern about personal data is not only a matter of privacy, but a matter of an individual's power to decide how to manage one of the most valuable assets consumers have in modern capitalist systems. Nowadays, people see their

personal data and virtual profiles as a sort of currency and are therefore willing to take advantage of them in different environments—not only through traditional shopping discounts, but in other contexts such as job applications. For example, the PricewaterhouseCoopers Consumer Privacy Report (2012) found that 73 % of customers are willing to share personal information depending on the benefits that they will get in return, such as discounts or coupons, and LinkedIn Talent Solutions (2015) noted that social professional networks are the second most preferred source for quality hires among recruiters, experiencing a growth rate of 73 % during the last 4 years. Thus, current trends are leading to a situation where, despite being eager to share and exchange personal information, Internet users need a clearer picture about how their personal information is stored, managed, and secured within the Internet.

In conclusion, it could be said that the main potential result coming from such practices is the creation of individuals' and organizations' virtual networks that help spread information about the sort of civic causes they care about. Even if a small active element (promoter) could be appreciated in these types of participation, the main outcome will always be the dissemination of information across passive actors, seeking to obtain some kind of support from them.

Deliberative Practices

Deliberative practices seek to engage citizens in public debates and discussions revolving around social issues. Citizens' empowerment—allowing them to express their opinions within open processes, interactively—stands out amongst the advantages of promoting such participatory processes. A good example can be found in participatory foresight practices, a new approach within foresight research, which advocates for a more active, direct, and continuous relationship between citizens and organizations (Salo and Cuhls 2003; Könnölä et al. 2006). The most important objective consists in opening the processes of reflection about the future to a wider range of actors, in particular those who have traditionally been ignored, at least in a sustainable/participatory way (e.g., citizens, users, or voters).

Since opening these processes to different social actors has been a major concern, many participatory foresight initiatives taking place over the Internet have arisen over the past several years. Table 3.2 lists some examples of online platforms that represent valuable efforts to generate virtual spaces for global discussion about future challenges. These kinds of platforms are trying to boost the participation of different actors in the common task of solving global problems, insofar as they are trying to take individuals from the theoretical context of a network to real action:

Unlike the previous type of participatory practices (supportive), this one permits the creation of spaces for open reflection and discussion. This enables collective intelligence, in the sense that participants are made to enter a more active process, where different questions and insights are subject to discussion in order to explore

Table 3.2 Examples of deliberative platforms focused on social issues and main future challenges

Title	Platform self-description	URL
Challenge: Future	Global youth think tank creating a community of talent and ideas for the world that works for everyone. Inspire tomorrow's talents and connect them with today's opportunities through future thinking and collaboration	www.challengefuture.org
Forum for the Future	Global community of leaders; a group at the leading edge of sustainability, or with the ambition to get there fast	www.forumforthefuture.org/forum-network
Future Challenges	A place where people come together to create forward-looking change	www.futurechallenges.org
Future We Want	Solutions oriented to movement, showcasing sustainable success stories from around the world	www.futurewewant.org
Global Changemakers	Global youth network of social entrepreneurs, community activists, and advocates trying to empower youth to catalyze positive social change	www.global-changemakers.net
Mass Idea	Open Innovation community where people can share not only their ideas but also today's challenges and visions about the future; key factors when creating new innovations	www.massidea.org
Open Ideo	A place where people design better solutions, together, for social good. It is an online platform for creative thinkers	www.openideo.com
Sustainia	A global collaborative platform meant to build a model and vision for a sustainable future	www.sustainia.me
TakingITGlobal	A global network through which youth can be empowered to understand and act on the world's greatest challenges	www.tigweb.org
United Dreams of Europe	A Pan-European online project that reveals opportunities, as well as challenges, associated with a united Europe	www.uniteddreamsofeurope.eu
Voices of Youth	UNICEF's online place for young people to learn more about issues affecting their world	www.voicesofyouth.org

different approaches to solving social challenges. Taking this into account, some critical issues need to be highlighted when it comes to guaranteeing success in this kind of participation, including the level of knowledge/preparation about the topics to be discussed (and broad general knowledge as well). A deeper level of knowledge amongst participants should be ensured—along with greater diversity in their points of view—in order to significantly enrich such processes (Gibson 2006).

Other critical issues when trying to develop this type of practice come from linguistic and cultural gaps. Guilló (2013) reports that participants in these types of processes see the possibility to share experiences and points of view with people from different cultural backgrounds as something positive. However, language barriers, along with a lack of reference points to contextualize some visions about social and cultural issues, are still considered obstacles when deciding whether or not to take part in such deliberative processes.

Deliberative practices are thus regarded as a promising area for developing projects that could allow civic participation from an active approach. However, a comparison between deliberative processes and supportive processes allows us to clearly state that the level of engagement required is higher, both quantitatively (time) and qualitatively (type of interaction with the network). Citizens involved in deliberative practices need to dedicate more time to focus on the issues addressed, and more critical analysis is required in order to promote a deeper reflection on the topics under discussion.

Collaborative Practices

On the whole, and compared with the types of participation described above, collaborative practices could be considered the most active type of collaboration, as citizens can work together on joint projects and actions, to support social issues. Carrying out collaborative practices for civic engagement purposes is by no means a Web 2.0 invention; they have been developed for decades and have constituted one of the basic pillars to boost more active and proactive ways of civic engagement during the second half of the twentieth century (Harrison and Barthel 2009). What the rise of social media brought as a novelty was an increasing number of people willing to integrate into this virtual participatory environment, trying to master different communication and networking tools with the aim of taking an active role in the issues that aroused their interest (Rheingold 2008).

This idea is also related to the *open innovation* organizational paradigm, according to which companies and institutions (including those focused on social welfare and innovation) can and should use external ideas as well as internal ones, as they seek to advance their technologies and projects (Chesbrough 2003). The *closed innovation* paradigm claims that successful innovation requires control. Particularly under the closed innovation approach, firms (and organizations in general) should control the generation of their own ideas, without integrating all the stakeholders or actors involved into the entire process. In contrast, the open innovation approach can be regarded as a kind of revolutionary paradigm affecting the way in which politics, economics, and even technology, should be approached. Nowadays, public and private institutions seem to be taking a greater interest in identifying and understanding citizens' expectations and wishes (European Commission 2008; EACEA 2013), which has led them to promote actions in line with the new open innovation paradigm (Ebersberger et al. 2011).

The rise of Web 2.0 has also led to the emergence of numerous crowdsourcing and crowdfunding platforms, built on similar principles as those of open innovation. Crowdsourcing is understood as the collection of contributions from many parties in order to carry out a particular project or venture. Crowdfunding refers to the collection of funds through small contributions from many parties in order to finance a particular project or venture platform (Howe 2006).

Another good example of collaborative practices is open source developments, defined by Lakhani and Von Hippel (2003) as a development model which promotes universal access via a free license to a product's design or blueprint, and the universal redistribution of that design or blueprint, including the subsequent improvements which anyone might eventually make to it. The growth of open source has been widely reported in the corporate context, and this is a very good indicator when trying to foresee future developments in other social contexts: According to the ninth annual Future of Open Source survey (North Bridge and Black Duck Software 2015),

> 78 % of respondents said that their companies run part or all of its operations on OSS and 66 % said that their company creates software for customers built on open source. This statistic has nearly doubled since 2010, when 42 % of respondents in the Future of Open Source survey five years ago said that they used open source in the running of their business or their IT environments. (para. 4)

These kinds of practices are fully geared to enhance different types of participation, from supportive to collaborative, where an attempt is made to solve a specific problem. Talking about civic engagement, the main expected results coming from such participation would be fully collaborative actions, in the form of civic projects aiming to face social challenges. In this case, an important aspect is to provide users with the attitudes and skills needed to perform such actions through social networks. These attitudes and skills also turn out to be relevant in the case of supportive and collaborative practices, but they become critical in the case of collaborative practices, which require mastering different types of digital communication tools, codes, and strategies that should not be taken for granted.

Scenarios

Based on the three kinds of practices, three future scenarios of participation and civic engagement are presented.

Machine-Generated Insights

This scenario describes a future where passivity appears as the prevalent approach to civic engagement. Current trends described above (such as fast-growing networks, passivity, and a lack of interactions among social network users) are guiding us to a future society with huge virtual networks, where interactivity has been

reduced to the simplest expression. And this is so because, in terms of social capital, citizens consider it more important to follow (passive attitude) than to participate (active attitude). Information is misunderstood as knowledge, so users make an effort to expand their virtual networks in order to access as much information as possible, and then trust intelligent systems that make it possible to filter and process that information for them. This situation means the death of critical analysis, since users' main aim is to access information rather than process it.

Faced with this situation, a decision was made to entrust machines (sensors, robots, supercomputers, etc.) with the duty of generating knowledge, which means that these processes are no longer taken care of by us. The users' main role therefore consists of: (1) generating information coming from their own activity (thanks to IoE developments); and (2) looking for more groups and platforms affiliations, which can be considered an important source of information. However, their main social use is helping develop their identity as a node of the network. This is a double play, where people are self-generating data (in real time) and building up a network of potential sources of information. In this context, their social status will depend on the amount of data and potential sources of data they can access. Thus, the role played by humans is as suppliers of information to machines, and our hope is to achieve insight from this and, finally, to adopt decisions based on these machine-generated insights. A good general example would be the field of nutrition, where machines could help people to shortlist most suitable options according to self-generated data in real time (e.g., specific nutrients according to dietary needs, personal daily schedules, emotional responses and moods) in contrast to other sources of information (e.g., weather conditions, restaurant offers, traffic information).

As far as civic engagement is concerned, this means that citizens' capacity to act in response to societal needs is limited to "follow/unfollow" decisions not only due to the loss of a critical analysis skills but also owing to the lack of traditional social skills such as face-to-face conversations or empathy. In this future society, people are more interested in virtual connections in order to reach a higher social status. This leads to new forms of personal connections, closer to the concept of affinity (like/unlike) instead of empathy. People are interacting with screens instead of faces (either in real time or not). If we want to talk about empathy, we will need to develop new skills that could allow us to better understand these new communication codes that are substituting traditional ones (for instance, nonverbal communication codes). This constitutes a hard reality for boosting civic engagement, since it is more difficult to build up a strong and sustainable connection with social causes and civic issues.

Rebellion from the Inside? Not with the Internet

The unstoppable growth experienced by the Internet in the last few decades could guide us into a future scenario where informationalism eventually becomes the new capitalism, in the sense of the dominant socioeconomic paradigm, giving few

choices to individuals and organizations that want to live outside that system. On the basis of "commonly accepted goals" such as transparency, security, efficiency, or productivity, organizations (governments, companies, institutions) force individuals and other organizations to fit within this system.

Therefore, citizens need not only have a presence on the Internet in order to fit in, but they are also required to take part in mandatory networking activities. It will be a citizen's duty to have sensors grafted into their bodies. Citizens must keep all the records coming from their daily interactions (social and professional interactions) for a certain period of time. Some examples of the types of records are images coming from eye-integrated cameras or data gathered from physical responses recorded by the grafted sensors. In order to keep the right to privacy, access to these data is regulated by law. The will to share it without restriction, however, becomes a widespread social convention: Those who prefer to "hide" their personal and professional contacts and activities will experience great difficulties in developing social and professional relations (meeting people, getting a job, etc.) because they will be negatively judged by others.

Within such a framework, our social networking activity and status directly become tangible social capital at both public and private levels. Companies that create an alternative economic system with these data emerge, and social capital becomes a kind of currency that is used in the form of credits/points exchangeable for different types of goods or services. As a result, sharing personal information and network connections with such companies becomes a passive, part-time job for many people treasuring high levels of social capital.

In contrast to these dynamics, more and more alternative communities try to promote a social model where any kind of digitalization is rejected and forbidden. These communities will try to lose as many links as possible via informationalism, since they believe that a revolution from the inside cannot possibly take place on the Internet. The reason for this belief lies in the fact that the power within this network is always going rely on the global corporations who own the infrastructure that supports the Internet. Thus, these actors are the first ones interested in keeping informationalism and its inherent status quo.

The Network Society

This scenario shows both governments and companies having already understood their roles in the development of a better network society, thus enabling the right mechanisms to boost civic engagement within social networks.

At a governmental level, education becomes a key issue for empowering citizens inside networks. Educated people constitute the basic foundation when trying to promote deliberative processes, not only giving others the possibility to express themselves but also ensuring that citizens own the ability, the tools, and the knowledge to defend their positions. An important measure to be fully implemented is the teaching of programming languages at primary and secondary education levels, conferring the "biggest global language" status upon them. This means the loss of

weight of "traditional languages" within the classroom. Since programming skills will allow citizens to create real-time translation software solutions, deepening the knowledge of second, or third languages, will no longer be considered a priority in education policy agendas worldwide.

This scenario contains the right balance between the three types of participation that this chapter has tried to depict. Thus, in this reality participation becomes a social right and a social duty, and is the biggest expression of global commitment to shared goals, such as ensuring sustainability, welfare and equality.

In this scenario, the Internet has become the official communication channel for every type of organization around the globe. Transparency becomes the biggest demand from citizens, and public and private organizations need to adapt their messages and communication strategies to the logic of supportive practices (which means prioritizing principles such as immediacy, simplicity and engagement capacity) in order to increase accessibility and dissemination of information. In this context, the philosophy of open data has become part of national and international regulations, and companies need to create open communication platforms that allow costumers to have full and easy access to organizations' activities.

Deliberative practices need to be fully implemented using social platforms, which allow us to boost global discussions in order to solve global challenges, such as global warming and migration. One of the key questions identified as a critical factor for the decision to become involved in such processes no longer represents a problem: Language differences have lost importance with the implementation of real-time, automated translation technologies. The refinement of real-time translation tools allows for discussions between people who speak different languages, both virtually and face-to-face.

Finally, collaborative practices will join forces in order to cope with global challenges. For instance, as long as our society can involve different actors in decision-making processes, it will assume a stronger commitment to shared aims—thus reinforcing citizens' membership values from their active roles.

Conclusions

As highlighted above, different features coming from social networks could enable new ways of civic engagement. However, it needs to be stressed that several counter-trends exist, which are also shaping the way in which citizens approach participation through these networks. Society has so far been unable to take full advantage of all the technological possibilities available to boost civic engagement levels: The technologies and infrastructure are here, but these alone are not sufficient to reach our goal.

In our view, the third scenario is a preferred, as it ensures desirable levels of participation and civic engagement within virtual environments. The key issue will be to find a balance between the three types of participatory processes and their resulting synergies that could help build and sustain open innovation ecosystems where every citizen has the chance to find a role for meaningful civic engagement.

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Chapter 4
Power and the Futures of the Internet

Sohail Inayatullah and Ivana Milojević

The Peak of Inflated Expectations

In an article (Inayatullah and Milojević 1999) now written over 15 years ago, we explored the futures of the Internet. The article was written during the initial period of excitement, of a dramatically changing world due to the rapid development of the emerging information and communication technologies. The two main points often made at the time were that the flattening of the system would lead to reduced inequity and that the new technologies would create the possibility of greater community.

First, like many others, we cautioned that the rise of the Internet was still within the context of global inequity. Indeed, "a recent Credit Suisse report estimates that the top one percent of the globe's population possesses nearly half of the world's wealth, whereas the bottom half of world's population holds less than 1 % of its riches" (Resnikoff 2014, para. 4). This structural issue had, and continues to have, tremendous implications for the 'liberating potential' of Internet and other recent ICTs.

Second, we cautioned that the Internet, as it speeded up time, had costs in terms of the ability of humans to slow down. We wrote:

> Thus, cybertechnologies not only create an information rich and poor but also information quick and slow. Time on the screen is different from time spent gazing at sand in the desert or wandering in the Himalayas or playing with loved ones. Screen time does not slow the heart beat down relaxing one into the super-conscious, rather we become lost in many

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> bytes, creating perhaps an era of accelerating information but certainly not a knowledge future or a future where the subtle mysteries of the world, the spiritual – the depth of the ever-present positive silence – are felt. When in times of crisis, the Net goes down, what will we do then, where will we go for our information-fix, will we have the courage to confront the spaces in our own minds? (Inayatullah and Milojević 1999, p. 77).

This quickening of the self was anticipated by McLuhan in 1980:

> Excessive speed of change isolates already-fragmented individuals… At the speed of light man has neither goals, objectives nor private identity. He is an item in the data bank – software only, easily forgotten – and deeply resentful. (McLuhan 1980, p. 32)

Selves lose reflective space, jumping from one object to another, one website to another, one e-mail to another. It is not a communicative world that will transpire but a world of selves downloading their emotional confusion onto each other. Zia Sardar writes in his book, *Cyberfutures*, "Far from creating a community based on consensus, the information technologies could easily create states of alienated and atomised individuals, glued to their computer terminal, terrorising and being terrorised by all those whose values conflict with their own" (Sardar 1996, p. 847). We thus argued that the then prevalent discourse was overly utopian, seeing the emergent Internet as the solution to the world's problems of development and alienation. In the Gartner (2014) model, we were at the peak of inflated expectations.

However, in sharp contrast to our critical position was the view of techno-optimists. We provide several quotes from thought leaders. Wrote, for example, Dale Spender:

> Cyberspace has the potential to be egalitarian, to bring everyone into a network arrangement. It has the capacity to create community, to provide untold opportunities for communication, exchange and keeping in touch. (Spender 1996, p. 229)

Wrote another leading author:

> Information technology is now the strongest force on Earth, primarily responsible for the collapse of communism, the restructuring of corporations and governments, and the general transformation of civilization into some new type of knowledge society. And what we have seen thus far is only the beginning. The really powerful technologies are likely to arrive during the next decade or so … The newfound ability to re-create human relationships at a distance through vivid, graphic electronic media will comprise one of the most significant advances in the life of the planet, electrifying the globe into a single, huge, thinking, and more highly conscious organism. (Halal 1998, pp. 543–554)

And Bill Gates (1995) argued that "It will affect the world seismically, rocking us in the same way the discovery of the scientific method, the invention of printing, and the arrival of the Information Age did" (p. 273). Finally, Nicholas Negroponte (1995) wrote that:

> While the politicians struggle with the baggage of history, a new generation is emerging from the digital landscape free of many of the old prejudices. These kids are released from the limitation of geographic proximity as the sole basis of friendship, collaboration, play, and neighborhood. Digital technology can be a natural force drawing people into greater world harmony. (p. 230)

Thus, in this future imagined in the late 1990s, cybertechnologies will allow more interaction creating a global *ecumene*. We summarized this argument in these words (Inayatullah and Milojević 1999):

> They create wealth, indeed, a jump in wealth. The new technologies promise a transformational society where the future is always beckoning, a new discovery is yearly. The oppressive dimensions of bounded identity – nation, village, gender, culture – will all disappear as we move in and out of identities and communities. It is the end of scarcity as an operating myth and the beginning of abundance, of information that wants to be free. The late 20th century is the demarcation from the industrial to the information/knowledge era. Progress is occurring now. Forget the cycle of rise and fall and life and death. That was but misinformation. (p. 79)

Centers, Peripheries, and Nodes

We did not argue about the potential disruptive possibilities of the Internet—disintermediation, for example—but rather with claim that the Internet would solve issues of power and access/equity. We certainly did not foresee the dramatic uptake of mobile technologies throughout poorer areas, indeed, allowing Africa to leapfrog copper-based telephony and move to mobile phones and lead in innovation through new ways to share money (m-pesa, for example) (Davies 2014). However, the core of our argument is that *fast modems*, or speed and connectivity in today's language, will not necessarily lead to a global, pluralistic society wherein the invisible can become visible. Certainly dial-up modems have mostly disappeared and there has been a breathtaking development of applications—apps—that can assist the disabled and that can create seamless spaces for social and political protest movements to organize for social justice. Issues of power, however, remain pertinent.

Many predicted (Friedman 2005; Toffler 1981) a flatter society and, to some extent, this has certainly come about as vertical organization has been challenged. Corporations, for example, explore flatter processes through the social economy. Forecasting accuracy increases with the wisdom of the crowds and experts' big data analysis. Indeed, the user now adds value instead of being merely a customer or client or convert. General Electric recently ran a global crowdsourced program to develop a titanium engine bracket. The winner was not from either MIT or Harvard, but rather a 21-year-old student from Indonesia (General Electric 2013). Thus, democratization qua flattening is taking place in a number of niche areas and new information and communication technologies have been helpful in this process. While there are certainly tens of thousands of examples of this, noteworthy is an initiative of the government of Finland. With the government, Open Ministry, a nonprofit organization based in Helsinki, Finland, focused on crowdsourcing, citizen initiatives, and deliberate democracy. Amongst numerous citizen initiatives

> … the Finnish system of citizens' initiatives stands apart for two reasons: firstly, the state provides an online platform where initiatives can be presented and through which the required signatures can be collected. Secondly, the scope within which new laws can be proposed is notably vast, making citizens' initiatives a potentially powerful tool. (Henriksson 2014, para. 5)

Over time, we could easily see, while not the elimination of the legislative representative, reduced power for the parliamentarian with citizen voices having far more power. This is not to say representative democracy will become direct democracy, but representation will likely become far more varied with multiple channels (Dator 1998).

In the economic world, disintermediation challenges the traditional middle man, allowing producers to dramatically enhance their ability to reach markets. However, the flattening has not led to a one person, one vote global democracy. Rather, as network theory accurately predicts, node centers have dramatically increased their power. Node centers are able to influence others in disproportionate ways, often through the politics of fear and exclusion. In the Islamic world, for example, instead of a true flattening where every Muslim interprets the Quran as she or he best understands, i.e., he or she struggles with the text (Inayatullah and Boxwell 2003), interpretation has gone to feudal mullahs/mulvis. Many of these conservative religious leaders have not used the Internet to create a more compassionate politics of religion, but have instead focused on creating a politics of division, of deciding who are the true Muslims and who are not. They have equal access to the billions and are able to spread their message of hate to the disaffected unemployed youth all over the world. Learned scholars are thus in equal footing with demagogues and violent groups such as Al-Qaeda and *Daesh*. They have used the Internet with dynamic innovation. Understanding spectacle, they have used beheadings as a way to create their desired future of Western states attacking Muslim youth, thus leading moderate Muslims to join the radical. As Simpson (2014) has recently argued, Daesh and other radical organizations have understood the new economy and use modern management models drawn from groups such as General Motors. They understand that the few can dramatically broadcast to, and thus influence, the many. They understood that they do not need to tell the truth or remain fact-based but need only to repeat statements such as "the west is evil, non-believers should die" with supporting images. They have learned from the make-believe reality of Hollywood but used the Internet to spread their particular worldview.

So, while we argued (Inayatullah and Milojević 1999) for a Gaia of cultures and of civilizations, a deep dialogue of the softer, and the inner perspectives of all religions and perspectives, the harder—the extremist aspects—has not only not disappeared but has been energized by the Internet. We thus remain convinced that we still need to:

> … imagine and help create social spaces so the new technologies participate in and allow for the coming of a real global civilization, a *prama*, a gaia of cultures; one where there is deep multi-culturalism; where not just political representation and economic wealth are enhanced but the basis of civilization: the epistemologies of varied cultures, women and men, how they see self and other. To begin to realize this, first we need to critically examine the politics of information. We need to ask if the information we receive is true; if it is important, what its implications are, and who is sending us the information. We also need to determine if we can engage in a conversation with the information sent – to question it, reveal its cultural/gendered context, to discern if the information allows for dialogue, for communication. We thus need to search for ways to transform information to communication (going far beyond the 'interactivity' the web promises us), creating not a knowledge

> economy (which silences differences of wealth) but a communicative economy (where differences are explored, some unveiled, others left to be). (Inayatullah and Milojević 1999, p. 85)

We argued that while the Internet, as a global brain, had the capacity for this possible future, communication was and would remain primary. As it has turned out, the Internet has become more accessible and faster, but while it has activated many forces that reduce inequity (for example, Change.org, Destroy the Joint, Avaaz.org, Getup!, The Occupy Movement), it has also been a boon to the extreme far right, in the guise of, for example, Islamic extremists, the websites that support them, and the Western press that mirrors them (e.g., Planet Murdoch and Fox News). The mirror—the Western press—has used the Internet for extremist, exclusive, and corporatist politics while claiming that they represent the values of the enlightenment. They, too, have learned the power of nodes—charismatic individuals who can influence the many—but have buttressed that through billion-dollar conventional multimedia platforms. Thus, in the dream of a Gaia of civilizations, we have seen the new ecology creating new predators, large corporations like Fox, and smaller, raptor-like creatures who are able to use violence to shape the global debate.

Thus, while speed and access have certainly led to new applications that can help the poor—farmers understanding weather conditions, having access to real-time pricing of their goods (Sivakumar 2013), or helping those in villages with health diagnostics (Cohan 2011)—vertical power in communications technologies remains. Indeed, it has been accentuated to a great degree in that those alert to the new rules of the Internet have disproportionate power to frame debates.

For example, what is newsworthy and what is not continues to be connected with power and the politics of inclusion and exclusion. An often raised issue is the disproportionate media attention given to victims of large scale violence, including terrorism, in different parts of the world. In the wake of the Charlie Hebdo tragedy in Paris, social media ran wild with comparisons between this and other crimes where there were dramatically more victims but significantly less media coverage, such as the atrocities by Boko Haram in Nigeria. For example, a study conducted in 2014 suggests that "media outlets publish three to ten times as many stories about France than about Nigeria. This disparity is striking as Nigeria's population (estimated at 173 million) is almost three times the size of France's population (66 million)" (Zuckerman 2015, para. 16).

Even in Nigeria, "the violence in Paris received more media attention than the massacres in Baga and Maiduguri in the three days the story was unfolding" (Zuckerman 2015, para. 7). Furthermore:

> There's bad news for those hoping online media will change existing patterns of media attention: while broadcast news outlets ran 3.2 times as many stories about France as about Nigeria, online media outlets published more than ten times as many French as Nigerian stories (10.4 to be precise). (Zuckerman 2015, para. 17)

Our conclusion is that, by and large, centers of (former and current) power continue to receive much more attention than globally marginalized spaces. Thus, the deeper transformative change has been the power of the few to dramatically

influence the many. This does not mean one cannot opt out of Facebook, for example, but opting out merely means a lack of influence. However, staying within the system has multiple challenges and can create many possibilities for change.

Taking a Both/and Perspective

"Twitter is a nasty, nasty place – don't get on there unless you're tough." (Anonymous Internet user, cited in Munro 2014, para. 8)

> Online trolling, cyberbullying, identity theft, and the unsolicited sharing of personal information, including images (i.e., nude photographs) have made some people's lives dramatically difficult to the point of a number of (mostly young) people committing suicide. The hacking of personal data and various security systems (i.e. national security, financial, communication and transportation systems) remain real and present dangers. Our collective and individual minds are changing: attention span is going down, and cravings for immediate gratification up. This is the quickening of the self as anticipated by McLuhan in the 1980s and mentioned in our 1999 article.

Indeed, misogyny, racism and other types of nastiness towards minority groups remain rampant, as they do in non-digital global and local societies. Racist prejudice continues to fit the dominant framework, thus the "criminal, crazy, suicidal" act (Miranda 2015, para. 27) by Andreas Lubitz, a copilot who deliberately crashed Germanwings Airbus A320 in March 2015, potentially fuelled by "serious depressive episode" (Käckenhoff 2015, para. 11), has been reconstructed as a problem with Islam. "Based on absolutely nothing," a US-based Christian Televangelist suggested that copilot's actions could somehow be "explained" if he were a Muslim (Allon 2015, para. 1). The Internet went viral with reports that Lubitz was a convert to Islam (see Chandler 2015), despite repeated rebuttals that there is no hard evidence supporting this claim. However, "Muslims"—all Muslims—"are responsible for this mass murder of civilians," claimed another Internet-based news source (Michael Mannheimer, as cited by the Shoebat Foundation 2015, para. 2). This is so "indirectly," as "the knee-jerk reaction to 9/11 produced the ill-conceived reinforced cockpit door that had catastrophic consequences" (Shoebat Foundation 2015, para. 25). As much as the Internet is about unlimited access to information, it is also an unlimited source of disinformation, conspiracy theories, and the relentless blaming of "others."

At the same time, the emergence of social media has indeed enabled the enhancement of "net-weaving … done in a context of community or friendly groups and not in a context of alienated individuals" (Inayatullah and Milojević 1999, p. 84). Campaigns focused on "the quality of life of the majority of people" (Inayatullah and Milojević 1999, p. 84), Activism 2.0, or online activism, is sometimes accused of "slacktivism"—feel-good actions that result in no meaningful social impact. However, there is no doubt that some campaigns have indeed changed existing power arrangements at the micro level. One example is the successful Australian petition that resulted in the banning of sales of the *Grand Theft Auto 5* video game in major

stores—due to what the petition describes as "sickening [content] which encouraged players to commit sexual violence and kill women" (Watson 2014, para. 5). Another example is the involvement of the Australian immigration minister who revoked the visa of the similarly misogynous "pick-up artist" Julien Blanc, who focused on teaching men "how to 'pick-up' women using physical force and emotional abuse" (Davey 2014, para. 6). In the latter case, protestors highlighted Blanc's "videos, Twitter feeds and photos promoting violence against women and abuse as a means of attracting them" (Davey 2014, para. 7). The #takedownjulienblanc Twitter campaign was led by online activist Jennifer Li, who helped spread word of his talks, and an anti-Blanc Facebook page as well as an online petition urging the Australian immigration minister to deport him also emerged. In addition to revoking his visa by the Immigration minister, Victorian police Commissioner Ken Lay also issued a statement condemning Blanc's activities:

> I've seen Julien Blanc's work … To me most of it appears to be deeply disturbing and offensive. Labelling women as objects and actively promoting the abuse of women degrades the dignity of our whole community. We want to assure everyone that we have been paying close attention to this issue and appreciate that so many community members have expressed concern. (Davey 2014, para. 12–13)

There have been many more instances where online activism engaged communities, police and governments, including the passing of The Criminal Law Amendment Act in 2013 in India, on laws related to sexual offenses and in light of the protests in the 2012 Delhi gang rape case. While public, physical protests created momentum for such legal changes, the scale and the impact of these protests would not be of such magnitude if not for social media and digital activism. While the questions over "loopholes" and poor record of law enforcement remain, meaning "much, much more needs to be done" (Nessman 2013, para. 4), the change was nonetheless recognized as a significant moment wherein many steps forward have been taken (Nessman 2013). Online petition site Change.org has an extensive lists of online petitions claiming "confirmed victory": from the freeing of Meriam Ibrahim, a Sudanese mother, doctor, and Christian who was sentenced to flogging and death, to the announcing of approval of designs for an all-female scientist series by LEGO. In some of these, and many other instances, the Internet has certainly participated in the "decolonisation processes, giving power to communities and individuals" (Inayatullah and Milojević 1999, p. 86) to create social change that we discussed earlier. It is thus today a "both/and" process where power continues to be renegotiated. The world has certainly become flatter; at the same time, large corporations and dominant worldviews still define the real. And simultaneously, citizen groups have the power to seamlessly challenge power, whether through the "buycott" of products or the highlighting of particularly grievous injustices. Citizen groups can scale up their protests dramatically through the use of cyber-weaving strategies. And, of course, so can particular groups such as Daesh, who use the Internet to create spectacle and ensure that global attention stays on them so they can attract young recruits. Alternatively, Islamophobes also use the Internet to promote hatred against Muslims. Traditional power—the vertical power of feudal systems is challenged—as flatter structures grow. However, the new flatter structures raise

issues of privacy, digital "street" justice and injustice, information and misinformation, among other concerns. Power to influence has been dramatically enhanced, provided an individual or a group has the means to do so. The means are not only technological or in time and energy, but also somehow linked to existing cultural templates, thus deciding what gets to be heard and what is silenced.

Alternative Futures

But that is the present. The next part of this chapter focuses on the alternative futures of the Internet. What are these?

Based on a literature review and dozens of workshops with citizens, decision-makers and experts on foresight, the following futures emerge. The structure of the scenarios is based on the Causal Layered Analysis model, wherein reality has four levels: the observable but superficial litany level; the supporting systemic level; the deeper worldview level and the deepest myth/metaphor level (Inayatullah 2004; Inayatullah and Milojević 2015), incasting model. These four levels frame scenarios and allow a robust and in-depth understanding of the future. The four levels focus on that which is observable (the litany), that which supports the observable (the system), that which makes sense of the litany (the worldview), and that which is the deepest and often the most profound (the myth-metaphor). This approach allows an easy way to compare scenarios and understand them at different levels.

The Leap-Frog or Bypass

In this future, the poorer nations of today, by being less invested in today's technology, jump over the wealthier nations, and lead in creating new Internet futures. There are a number of crucial drivers. First, poorer nations are not as vested in the traditional telephone and thus can jump to mobile and smart phones. Second, Internet technologies afford the ability of traditional communities to stay coherent, in that the move to the big city will no longer be required. Third, the rapid urbanization in industrializing nations has created tremendous problems (traffic congestion, for example) that could be solved through working from home, or creating community-work stations. Fourth, Asian and African nations are starting at relatively the same start-off point: the West has an advantage but it is not insurmountable. And, finally, the Internet creates disintermediation, allowing a greater ability to produce services to global customers. There are fewer weights to entry, and discrimination is far more difficult.

As an example of this, at one workshop in Bangladesh for the Ministry of Health, participants imagined the Bangladeshi health system jumping over the hospital-based Western system. In this future as presented in Table 4.1, virtue would be rewarded and vice penalized, i.e., health would be incentivized. Health power

Table 4.1 The leap-frog—current and future

Layer	Current	Desired future
Litany	Expensive, for the few	Affordable health solutions and prevention
System	Centralized, hospital based	Decentralized in villages, led by women
Worldview	Medical system	Medical system to person-in-community health ecology
Metaphor	Catch up to the West	Leap frog, bypass

would be decentralized to the individual within village communities. Using Bangladeshi-developed tablet computer systems, health would be diagnosed by village health workers. These women would then send the information to experts in Dhaka. Of course, as Artificial Intelligence develops, there would be no need to relay the information as smart systems themselves could make the diagnosis. The goal of this system would be to find affordable health solutions that empowered local communities through locally invented Bangladeshi health technologies and applications. Health would thus be personalized but in a community context, i.e., just as micro-credit lending succeeded by creating small groups of women who borrowed money and supported each other; groups of women would support each other's health futures. Greater access would come through a rethinking of power and politics. However, and this is crucial, as Ministers fund projects wherein they "can cut the ribbon," government leaders would need to get credit to move toward a lower-cost, prevention-based system. The current system reinforces the hospital, not nodes of new power and health networks. The main points for this scenario and example are (1) A new story—the leap-frog or bypass; (2) A new measurement system focused on early diagnostics and prevention (New incentivized systems where being healthy was rewarded); and (3) A new way of thinking that moved the discourse from the medical to the personal/community. In this future, the Internet would become even more important. Costs would need to go down and network would speed up. Penetration to each person in poorer regions would be crucial. The Internet would become the vehicle to leap-frog over the West, just as the steam engine and other industrial technologies allowed the West to leave Asia behind. Smarter phones/tables and other hand-held devices would become even more important. Using the Internet to bypass large feudal bureaucracies could create a new ecology of innovation, leading to a system of new social technologies that alleviate poverty and enhance wealth. In the African context, this is the rise of Silicon Savannah in Kenya (Anderson 2015) For example, writes Anderson: "Kenya, which has long been seen as a leader in mobile technology, has 32.2 m mobile subscribers giving it a 79.2 % mobile penetration rate. Many of the country's projects focus on developing products that reach Kenya's poorest through SMS services available on basic mobile phones (para. 10)."

And, as the previously excluded gain access to the new ICTs more, perhaps their issues and priorities as well as worldviews will become heard more and more.

Cycles of Violence and Surveillance

The main driver in this future is perceived injustice and the ability to use violence and spectacle to challenge this injustice. Whether through the Internet or emerging 3D printed technologies or drones, the weak are able to inflict violence on the strong. This is likely to create an endless cycle of violence—today by Islamic radicals, tomorrow by other parties … and state forces who react to this violence. Each act of violence will lead to greater surveillance, and citizens directly or indirectly willing to give up civil rights for overall safety. Over time, we can imagine citizens implanted with bio-chips that send signals about their whereabouts, their purchases, the texts they read, the Facebook pages they like, where they travel, and the company they keep. Big data is brought in as a promise of increased efficiency and productivity, but over time leads to the full surveillance state and society. Certainly, costs can be reduced by big data technologies in that early health diagnostics reduces dollars spent on health; predictive policing concentrates policing power and reduces inefficiencies inherent in presence model policing (policing by driving around); and taxi services like Uber reduce carbon emissions and leads to the full utilization of roads and cars, for example. Thus, the seduction of cost reduction and security concerns of radical groups leads to a full surveillance society. The guiding story is a mixture of "big brother and meddlesome auntie"—the future thus is predictive based as shown in Table 4.2. It is big data run. Dissent is built into the system, i.e., safe models of protest are allowed. Efficient systems rule the day and the worldview shift is from individual freedom to collective safety.

The Internet becomes ubiquitous like air and is everywhere. The bargain for efficiency leads to safe and predictable society. This is the move from Internet 1.0 to Internet 3.0—the Internet of people, things, and places. Internet 2.0, with flatter systems wherein the user adds value, is bypassed. The challenge in this future is both the loss of emergence and creativity and the darknet, portions of the Deep Web not accessible via standard Web browsers (Chacos 2013)—the world of "credit-card scammers, forged documents and currency, weapons dealers, gambling sites, marketplaces for every vice imaginable, hacker havens, the types of illegal and disgusting porn that get chased off the Surface Web" (Chacos 2013, para. 12). The darknet does not disappear in the command and control future; rather, it disappears and reappears in unexpected spaces leading to greater calls for surveillance.

Such a world may disempower almost everyone, with the exception of successful MobNet criminals, and the emergent e-totalitarian states.

Table 4.2 Cycles of violence and surveillance—current and future

Layer	Current	Future
Litany	Big data a novelty, citizen excitement	Big data reduces costs and increases efficiency
System	Open and emergent	Predictive
Worldview	Flat, ecology	Command and control
Metaphor	Frontier	Big brother and the meddlesome auntie

Gaia of Civilizations

The main driver for this idealistic scenario is the development of a new demographic group—the Cultural Creatives. There has been a shift away from traditional conservative and modernist values to trans-modern or ecological values in the past 40 years (Ray 2008). From being only 3 % of the population, Cultural Creatives have jumped to over 40 % (Tibbs 2011). Writes Ray:

> Their [Cultural Creatives'] most important values include: ecological sustainability and concern for the planet (not just environmentalism); liking what is foreign and exotic in other cultures; what are often called 'women's issues' by politicians and the media (i.e., concern about the condition of women and children both at home and around the world, concern for better health care and education, desire to rebuild neighbourhoods and community, desire to improve caring relationships and family life); social conscience, a demand for authenticity in social life and a guarded social optimism; and giving importance to altruism, self-actualisation and spirituality as a single complex of values. (Ray 2008, p. 7)

Also important is their link to new technologies, argues Ray:

> The other major influence on their growth has been the growing information saturation of the world since the 1950s. In fact the Cultural Creatives are simply the best informed people. They take in more of every kind of information through all the media, and are more discriminating about it as a result. Many successfully blend their personal experience with new views about how the world works, and why – their new values and commitments have rather organically grown out of their synthesis of all the information. (Ray 2008, p. 8)

And two key dimensions of values are more important to Cultural Creatives than to others: (1) green and socially responsible values, and (2) personal development values, including spirituality and new lifestyles.

As shown in Fig. 4.1, Hardin Tibbs (2011), in his interpretation of Ray's data, suggests that there could be a shift in values by around 2020 as Cultural Creatives become the majority in certain parts of the world.

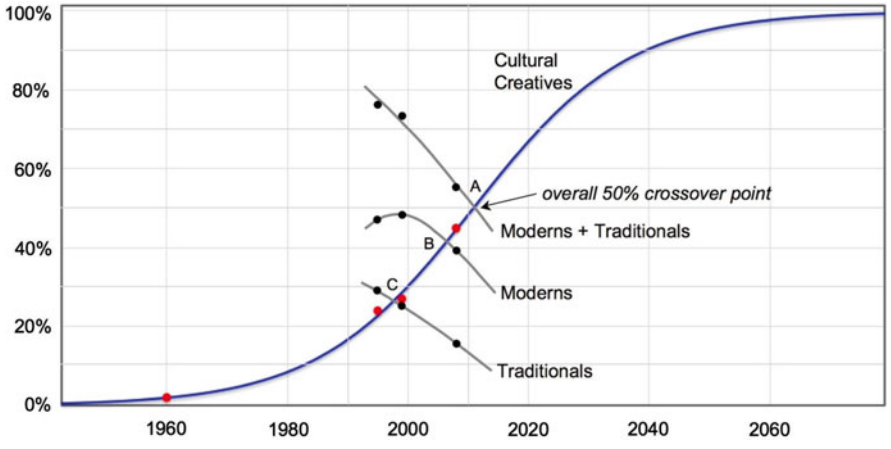

Fig. 4.1 Rise of the cultural creatives (from Tibbs 2011)

Table 4.3 Gaia of civilizations—current and future

Layer	Current	Future or desired future?
Litany	Fracturing of society and self	Greater coherence and integration
System	National boundaries	Global governance and regulation
Worldview	Informational battle of worldviews	Communicative dialogue of civilizations
Metaphor	By the privileged	The global brain

If Ray and others are correct, then this demographic shift could lead to a politics wherein the Gaian future suddenly moves from being marginal to center stage.

Thus, in this future as summarized in Table 4.3, the growth of the Internet—speech, access, dispersion—is built upon the fabric of ethical civilization rules. Illustrating the Gaian future through a concrete issue, for example, in terms of Charlie Hebdo, artists would mock but be careful not to challenge the dignity of each religion or civilization's core sensibilities. Dignity would not be lost, rather, the purpose of the artist would be to inspire toward greater globalization, and not the fracturing of society. The focus would be not on information but on communication—and preferably nonviolent communication (Milojević 2006). This would mean global regulation of the Internet, ensuring that the Internet would be equally accessible and Network Neutrality where bigger providers would not receive preferential treatment would be achieved. It would require development of emotional literacy and the intention not to harm/mock/ridicule, too. The Internet becomes the global brain, as H. G. Wells imagined many years ago—a true Wikipedia instead of the current version of Wikipedia that is damaged by trolls.

While this may be the preferred future for the majority, the obstacles are enormous. How do we change the dominant cultural frameworks of meaning? How do we move from a focus on violence and domination toward peaceful cooperation? Perhaps Cultural Creatives and new generations of interconnected global citizens will be able to lead such a transformation, but the weights of the past are heavy.

The Great Disruption

In this last future, the exact development of the Internet cannot really be predicted in the sense that disruption is built into the Net. What we can say is that Web 1.0 was based on traditional hierarchies, merely providing information. Web 2.0 has been interactive, user-led, and far more flat; even though power has not disappeared (i.e., it has activated the few to influence the many). Web 3.0 leaves the Web and, linked with the maker revolution/3D printing, i.e., the Internet of persons, objects and data, becomes the organizing medium of the knowledge society. The power shift entailed in this transition will likely be as dramatic as the shift from industrial to post-industrial. The main driver in this scenario is technology itself. In this future, we are not at the end of the Internet revolution but merely at its beginning. Disruption has just begun as presented in Table 4.4. Everything will be disrupted, from governance to war; from sex to the family; from the brain to our perceptions of God. And more

Table 4.4 The great disruption—future

Layer	Future
Litany	Disruption is the norm
System	Artificial intelligence—sensors everywhere
Worldview	Post-knowledge society
Metaphor	Giving birth

and more individuals will join in the disruption, creating futures that cannot be predicted from the categories of today. By 2045, there may well be direct e-democracy in parts of the world. Capitalism may have collapsed leading to the birth of a true sharing, efficient and progressive economy. The industrial era may have ended, leading to the birth of solar–wind era. The Internet may have become Gaia-tech, creating a new type of civilization we cannot imagine today.

As with all major disruptions, uncertainties are many, but if currently unforeseen events do come to fruition they may dramatically change so much that we currently know.

Conclusion

As we reflect on the future, what we certainly do not know is the nature of Web 4.0, if that occurs, i.e., will it be a merger of our minds with the Internet of things? As Google's executive chairman Eric Schmidt has recently forecast (Passary 2015), will the Internet soon "disappear" from our lives altogether? Or, will the Web become alive, a living entity, and if so, will it be Gaian sister or Big brother—and what will be its politics? Certainly we know its reach will be further, even to space, and deeper, into more inner spaces of our minds. And, while it is certainly the disruption that the techno-utopians have imagined, the issue, for us, remains: how will power be circulated, and will the new Web be data/information-based or move toward communication/wisdom? Can power be dispersed, used more wisely, or will reality always be a realist zero-sum game?

The futures of the Internet thus are multiple. What will emerge is far from clear. Will the Internet become the vehicle for wars of propaganda and terror—the rise of the darknet—or will it successfully be used by the current poor to either catch up or bypass the privileged and wealthy? Or will the intent become communication-focused and help create a system of global governance, a Gaia of civilizations? Or is the future of the Internet artificial intelligence-led, with Gaia giving birth to … herself? Most likely all aspects of these scenarios will occur as well as futures beyond our current imagination.

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Chapter 5
The Future of the Internet as a Rhizomatic Revolution toward a Digital Meanings Society

Sirkka Heinonen

Introduction

In this introduction three key points are discussed. First, I wish to emphasize the appropriateness of the topic of the future of the Internet for futures research. Second, the potential of the future Internet is highlighted both in terms of positive prospects, on the one hand, and looming perils, on the other. Third, a closer look is given to the driving forces of the development of the Internet. After the introduction, the second main section opens up four hidden assumptions related to the development of the Internet. Finally, three alternative and possible scenarios for the future Internet are presented, challenging the reader to assess their probability and desirability.

Future Internet as a Fruitful Topic for Futures Research

My first claim is that futures of the Internet can be aptly addressed through futures studies. Futures research is a new scientific discipline, originating in the 1940s and largely basing its theoretical foundation and evolving paradigm on Ossip K. Flechtheim's (1970) publication *Die Futurologie* and on Wendell Bell's (1997a, b) two-volume book *Foundations of Futures Studies*. Futures research can be defined as systematic, holistic, multidisciplinary, and critical long-term analysis of futures topics and alternative developments. Foresight is a more recent and pragmatic field inside futures research, involving structured participatory debate about the future of complex issues (Malaska and Masini 2009; Malaska and Holstius

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2009). The future of the Internet is a very fruitful topic to be tackled from the point of view of futures research and foresight, since it is a complex, multifaceted and fast evolving issue, with many uncertainties. One might even describe anticipation of the future of the Internet as a wicked challenge, owing to the factors of fast technological development, complexity, and interconnectivity, as well as the many societal ramifications it may bring.

The first principle of futures research is that the future cannot be predicted (Amara 1981). Instead, alternative futures can be anticipated and foreseen. Such futures images are classified into possible, probable, and preferred (or desirable) futures. Possible futures may differ from each other to a considerable degree as regards their probability and desirability. This article concludes by presenting three possible scenarios of the future of the Internet, which vary substantially according to their probability and desirability.

The Future Internet Is Full of Promises, Risks and Perils, and Prospects

The second point is to highlight the surprising factors and two opposing sides in the development of the Internet. When imagining possible futures for the Internet, we have to bear in mind that the Internet has surprised us many times. For example, the emergence and penetration of social media took place at an astonishing pace. The Internet, especially in its extended form comprising social media, manifests itself as a cornucopia of concrete *promises*. It has the capacity to make our daily life more effective, fun, and even reliable as we often search the Internet in order to find entertainment and answers to our questions and problems. On the other hand, the Internet seems to be full of looming *risks and perils*. It may fail us, contain deceptive content, or be used as an instrument for cracking data, resulting in identity theft and a loss of privacy. The Internet also holds many open *prospects*, depending on one's ability to utilize it. The Internet may be empowering, meaningful, entertaining, profitable, even ecologically sustainable when, for example, replacing physical transport by virtual communication.[1] Manuel Castells (1996) describes this spatial organization practice characteristic to the network society as the *space of flows*.

When exploring the futures of the Internet we should focus our reflections on societal and global development. The Internet can also be perceived to have the same kind of evolution as living organisms: birth; growth; blooming; obsolescence; and rebirth as transformation. This evolution takes place in close interaction with the developments in the surrounding society. Even if the Internet is blooming for humans as it penetrates into their daily lives ubiquitously in multiple ways, we must bear in mind that globally around two thirds of humankind have no access to the

[1] The author reflected both on promises and perils of future development of the Internet (under the title "Paths to Paradise or to Digital Demise") in an EU PARADISO Project Workshop on 23rd November 2010, Brussels.

Internet. The topic of changing societies is therefore contextual—different societies around the globe can be in different stages of societal development.

The future means change. Something always changes when we cross the bridge from the present to the future. The Internet itself is fast changing and the world within which the Internet is embedded is changing rapidly. Societies have evolved in stages that last lately decades, earlier centuries, even millennia—from the hunting and gathering society to nomadic communities, and then from the agricultural society to the industrial society—and finally to the information society, which is the home base of the Internet. We are today living the information society in most industrialized countries, while there are still societies in agricultural and nomadic stages. The information society, however, is itself already developing into something else—possibly transformed into bio-society, digital knowledge society, or experience society (Dator and Seo 2004; Heinonen and Dator 2012; Heinonen 2013; Jensen 1999; Rifkin 2000). If the Internet evolves to penetrate all available niches in its environment and ecosystem by following a rhizomatic model of biomimicry, will such growth escort us towards a *digital meanings* society where people using the Internet are empowered in their search for meaning in all their activities?

If we perceive the next stage of the information society as bio-society, then the role of the Internet is to help all sectors of society to save energy, and move towards renewables, reuse, and recycling. The Internet itself should also function in a way that wastes little energy or produces little hazardous electronic waste. If we foresee a digital knowledge society as the stage succeeding the information society and take a closer inspection, we may describe digital life as an overarching sociocultural platform as shown in Fig. 5.1. Through digitalization and the help of the Internet, all our

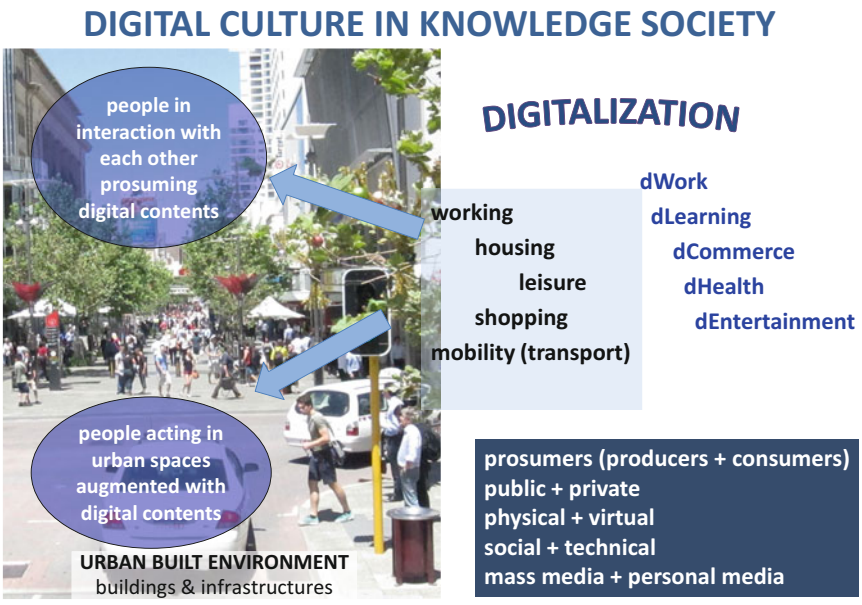

Fig. 5.1 Digital culture in the digital knowledge society

major activities such as living, working, engaging in hobbies, moving, and consuming would take place in various combinations of physical and digital forms (e.g., commuting or telecommuting). People would become increasingly prosumeristic—producers merging with consumers. People would be in constant interaction with each other, prosuming digital contents. They would act in urban spaces (buildings + infrastructure) augmented with digital contents. Not only production and consumption, but also public and private spheres, the physical and virtual, social and technical, and mass media and personal media are merged to create digital culture. Digital culture means the adoption of digital technology, products, and services into everyday activities. The Internet will be the mothership for prosumption of digital contents, based on information and knowledge generation, sharing, and elaboration.

Perhaps the next stage after the information or knowledge society is not just digital society, but a digital meanings society. There, digitalization is the enabling technology for people, companies, nations, and humankind to search for meaning in life—through lifestyles—and to create sustainable solutions.

The Future as Emerging Change Can Be Approached through Horizon Scanning

The third point is to draw attention to driving forces of change and futures signals indicating the coming change. In order to anticipate and understand the future paths of the Internet, one has to analyze and anticipate global change and futures signals. There are four levels of such futures signals, or indicators, pointing to future developments.

The strongest signals are *megatrends*. These are followed by *trends*, medium-strong indicators. The third category is *weak signals*, which are early signs of emerging issues that may or may not strengthen. The fourth category is *wild cards or black swans* (Day and Schoemaker 2006; Taleb 2007; Heinonen 2013). They are sudden, very rare, unexpected events. If they do occur, they will have radical impacts on society at all levels. Often enough, when efforts are made, for example in futures workshops, to anticipate black swans (even though they are very hard to be foreseen), the total and sudden crash of the Internet is mentioned. While the Internet is a network of networks, it is not easily foreseen to be permanently shut down by crackers or terrorists. Such a crash could be a result from a meteorite hitting the earth, destroying almost all human activities, or from a solar heat blaze wreaking havoc on power grids and shutting down all electricity.[2] However, if such anticipations become very common, a real crash of the Internet would no longer be a black swan. This question can also be posed: what other black swans could have a radical impact on the Internet (besides the crash of the Internet itself)? The future of the Internet can thus be probed in the future world of risks and uncertainties. Taleb

[2] For example, a major solar eruptive event took place on July 23, 2012 when a powerful coronal mass ejection (CME) tore through Earth's orbit.

(2007) even claims that the world is most changed by extremely unlikely and unexpected events. In Futures Cliniques, specially designed futures workshops, the main focus is on identifying futures signals—clusters of weak signals and wild cards/black swans—pointing to nonlinearities, disruptions, transformations, and radical emerging futures (Heinonen and Ruotsalainen 2013). The concept of wild cards or black swans is related to the wider concept of *antifragility*. Taleb coined this term to refer to the phenomenon where some organisms, organizations, or individuals seem to not only survive, but to flourish, in times of turbulence. Antifragility is something beyond just robustness or resilience. Whereas a robust or a resilient object withstands the difficulties, an antifragile object becomes even stronger when facing complexity (Taleb 2012).

From futures signals we can identify what are more generally considered as driving forces. The driving forces for future Internet are now closer observed. Identifying and assessing the driving forces is not only the starting point, but also one of the main objectives and first steps in scenario construction (Schwartz 1998). The driving forces are the elements that move the plot of a scenario and determine its outcome. We need to consider what driving forces we can identify from PESTEC (political, economic, social, technological, environmental, and cultural/citizen/customer) points of view.

Driving Forces Embedded in Futures Signals for Future Internet

When exploring futures of the Internet, we anticipate concrete future services, content, and infrastructure. Specific drivers characterizing future developments of the Internet according to Ahlqvist et al. (2008) are:

1. Continuous growth—The Internet is associated with growth and speed. The number of Internet users, services, and applications are increasing. This speedy growth stems from technology push and user demand (fast adoption of Internet services and applications).
2. Growing role of social media—Facebook has already become an essential part of the infrastructure. The growing role of videos and visualization on the Internet is visible in the popularity of YouTube, Flickr, and Instagram. This driver has definite educational benefits, since videos can be consumed by illiterate people as well.
3. Visualization—The next steps in visualization will be 3D, 4D, and holograms. When 3D and nanotechnological applications (e.g., Oculus Rift) make it possible for humans to view 3D Internet from every direction, immersion in virtual space will become more intense, penetrating beyond our normal visual capacity.
4. Balkanization—Balkanization is another driving force that is increasing. A push for balkanization derives from search for tailor-made content and communities.

Political or ideological elements build pressure for exclusive virtual spaces. There are a growing number of semi-closed platforms, so the Internet is no more a universal, open-to-all paradise.[3]

5. Net reputation and manipulation—The concept of Net reputation has become a widely discussed phenomenon, as much of identity work happens online. The concept of reputation holds several related opportunities and threats. On the one hand, attention and worldwide celebrity can be gained by a single YouTube video gaining popularity. On the other hand, the good reputation of an individual may be threatened through malicious and manipulative attempts such as identity theft or severe cyberbullying.
6. Curation—Curation is one of the most interesting characteristic of the Internet. New curated Internet or media services become available, since there is a growing demand for them. By access to curated sites you can actually get to know faster by reading less.

In addition to these drivers suggested in the report (Ahlqvist et al. 2008), other drivers can be identified. A major driver is the requirement for ubiquitous communication all the time. For the user, it is revolutionary that ubiquitous WLANs (wireless local area networks) enable a new browsing culture. So far this browsing culture has favored computers. However, mobile devices will soon become the main access point to the Internet, or they may already be so. Smart phones with high-quality cameras play a key role in popular, everyday culture. As mobile and electronic devices will eventually merge into *one* multitasking media communicator, we may move to wearable computing where all Internet uses integrated into clothing or even one's skin or brain. The Internet is internalized with the habitus, body, and all activities of the user.

Mobile devices with access to the Internet will contain more and more applications such as identity recognition, consumer behavior monitoring, health profiles, and personal history. The Internet already holds digital keys to personal identification. Increasing the use of a digital identity will also create threats: mobile viruses, data security, and overall monitoring of user activities, resulting in loss of privacy. Mobile phones are only the first stage of the pervasive Internet and ubiquitous society. The next step of ambient intelligence will be mobile equipment integrated into our clothing and environment: virtual glasses (e.g., Google Glass, Oculus Rift) already exist. This kind of wearable computing also covers digital body-piercings/jewelry and electronic tattoos. Finally, interfaces will be connected to the nervous system, which could lead to the development of global collective consciousness—(i.e., the Global Brain or Super-Brain discussed by Heylighen and Bollen 1996).

One central cultural change brought about by digitalization and the Internet involves the relationship between what is private and what is public. We are sharing more and more information about ourselves and about the world around us with others. The amount of communication has increased dramatically in recent years. Our lives have become more ubiquitous and transparent: we essentially live in a

[3] See, e.g., http://www.mondaynote.com/2010/05/02/balkanizing-the-web/.

fishbowl. In the future, there will be very few things we feel are too private to be shared online, though this extreme openness may also lead to the emergence of an opposing force. People are happy to trade in some of their privacy for personal benefit or a sense of security. And yet, knowledge of those online services compiling personal data, awareness of location-based data, have already prompted people to demand more privacy. In the near future, we will engage in more heated debate on the acceptable relationship between the benefits gained by giving out personal data and the advantages afforded by privacy. A surprising consequence of an open world may be pressure to conform: when most of our life is public, we will weed out the parts that might spark disapproval.

User-oriented design and user needs drive device and application designers. On the basis of these drivers and growing demand from users, a major innovation would be flexible and foldable electronics. This has a huge potential for print electronics. If we had a personal media communicator or eME device (i.e., an electronic device serving "me"), which could be folded, stretched, or molded at will, it would facilitate connecting to the Internet. When needed, a display could be drawn out, and a keyboard or other type of user interface (e.g., one based on touch, voice, or glance) would appear. Here, one must bear in mind that the size of the human hand restricts the interface design of external communication devices (i.e., other interfaces are still needed). As touch interfaces will be more common, feeling such as shapes and moisture can make the user experience more immersive. Speech recognition will also be widely utilized in the future. All senses could be provoked, and the ultimate interface will be by telepathy, touchless, controlled by thoughts. Severely disabled patients can already control devices by their eye movements and thoughts, as electromagnetic impulses are connected to the computer. Seamless human/technology interfaces may build upon combinations of neuromorphic computation, synthetic biology, and brain simulation.

New possibilities and visions for merging technology with humans are driving the development of new solutions. This means that the future of the Internet will strengthen human-machine interaction. Chips will be implanted in humans, enabling immediate communication via wireless Internet connections.

The above drivers were visible in a foresight study (Ahlqvist et al. 2008), and they have emerged quite strong for the past several years. Social media was there identified as the spearhead of future Internet development. Therefore, we can explore the future of the Internet through the lenses of the changes detected for social media. The evolution of the Internet and social media is intertwined. The fast emergence of social media is pushing for overall development of the Internet. The study provided the following building blocks of the future social-media-centered Internet:

- A new educational system for social media competence.
- Infrastructure.
- Proliferation of access points for the reception and delivery of our social media.
- Greater demand for filtered information.
- Gated virtual communities.

- Internet of Things.
- Cyber-exhibitionism: "privateness."
- Power shift from the center to the periphery.
- Empowerment of the individuals.
- Neuromancer-like (Gibson 1984) virtual reality.
- Meanings, experiences, identities.

When looking at the above building blocks of the social-media-centered Internet, there are several implications for further concrete action. There is a need for creating totally new educational programs for social media competence and literacy. For example, voice recognition software will lead to an educational shift away from teaching reading, writing, and arithmetic toward encouraging creativity, imagination, and critical thinking. Infrastructure for social media will be diversified to allow content to be produced and used for all senses, regardless of the physical location. There will also be greater demand for filtered information. This may take place through "community gardening" (i.e., curation) for gated virtual communities. The social-media-centered Internet will make full use of the Internet of Things (IoT). The IoT is a network of everyday physical objects that are interconnected with the Internet (Atzori et al. 2010). Accordingly, the social identity of a place is expanding. Next to what can be actually be seen, the place is filled with information, annotations, and other data traces left behind by networks of people (Gordon and Silva 2011). On the other hand, e locating and identifying people poses the risk of classifying or "numbering" individuals and their actions, as everyone can be located and identified.

There are also several social implications related to netizens' (citizens of the Internet) digital lifestyles. Many people are willing to disclose things about themselves, thus creating a trend away not from privacy but from "privateness." In other words information shared is carefully considered, and it happens deliberately. There is an intention to be open, but without losing privacy rights. The power shift from the center to the periphery will mean redistribution of power. The social media-centered Internet will also empower the individual, whether in center or periphery. This has been witnessed in democratic movements such as the one launched in Tunisia in 2011. Virtual reality may also create various sub-cultures such as neuromancer-like cyberpunk and dystopian entertainment. The Internet is becoming a more and more powerful instrument for searching for experiences and deeper meanings as well as for managing and expressing one's identity. This is pushing the information society towards a digital meanings society.

The seeds of the future Internet are sown in fertile soil. To sum up the development paths, when exploring the futures of the Internet, we can detect two major guidelines or pathways for the driving forces. On the one hand, the Internet has become and will become even more *internalized*. Virtual and digital worlds will be as normal as the air we breathe. The Internet will penetrate our body and mind. It will also be submerged in the surrounding built environment—in buildings, vehicles, infrastructure, and furniture. It will also act as a liaison with nature, helping us to immerse in digital nature mimicking natural surroundings. On the other hand, the

nature of the Internet is concerned with power, as stated above. Along with the decentralization process and full emergence of a peer-to-peer society, the individual will be empowered in many ways.

Hidden Assumptions

We will now move on to examine the hidden assumptions and premises in the development of the future Internet. A major hidden assumption for all developments for the Internet is that we need the Internet so much that life without the Internet would not be feasible. Many development trends and paths for the Internet have been questioned, but not the core idea of the necessity of the Internet. The future Internet is expected to be the central environment for all our activities. Step by step, the Internet will anchor open, interactive, and bottom-up network activities and ways of thinking in all we do. The everlasting marriage of the Internet and social media[4] seems promising.

The Internet is inherently interactive, and networking is part of this process: social media does not bring anything new to it. Media being social is a truism, since nonsocial media do not exist. Why not just talk about an Internet or network for self-expression and its various applications? Or perhaps we could start talking about Social Internet, social net, as the main platform carrying social media. Here, the hidden assumption of the Internet as inevitable is merged into our social construction of reality itself. The Internet has entered such everyday use that we may not be able to perceive all its features, potentials, and risks. The question is "Are we addicted to the Internet, or is the Internet simply a necessity for us, or perhaps even an intrinsic value?"

A second hidden assumption in reflections about the futures of the Internet is the illusion of our ability to separate technology from natural life. Technology is often seen as an independent, mechanical, and nonhuman force. It functions in an myopic and monomaniacal manner to actualize the values of efficiency associated with industrialization. We are all familiar with the image of the romantic tramp caught up in the wheels of the machinery. Jobs are lost to automation. Machines alienate us from real life, so parents shoo their children away from gadgets to play outside in the real world.

In some ways, the image is accurate. Over the past three centuries, technology has put into practice the efficiency paradigm, which reduces a human being to the stuff of calculation. It has helped us achieve higher productivity at lower costs. We have been turned into parts of machines, connected first to the numbingly

[4] Because of ready applicability, "social media" may become the most significant technology—or, perhaps more accurately, model of operation. The term itself—social media—should be stamped out since it is as infelicitous a depiction of the new medium as "horseless carriage" was for a car. In fact, it is even more inapt: both 'social' and 'media' are hopelessly commonplace terms. Even "horseless carriage" is a more successful attempt at description than, say, "fast vehicle."

monotonous rhythm of a conveyor belt and then to the pale light of the computer screen. Technology has contributed to our rising standard of living but has also brought with it mega-problems—ranging from population growth (people with more wealth consuming more material things) to climate change—that threaten the future of humankind. Technology has also brought along with it issues with security and information property rights, thus making our relationship with technology increasingly precarious and vulnerable.

A third assumption is evidenced by a techno-optimistic approach often hidden, but sometimes openly displayed, in considerations of the futures of the Internet. Technology is constantly admired. With the aid of technology, we can transcend the limits of our existence. Technology comes with the promise of progress, even redemption. Colored with fear and rejection, and with admiration and passion, our relationship with technology is complicated, yet full of expectations. In ancient mythology, Prometheus brought fire, symbolizing technology, knowledge, and skills—keys to a better life. Today, many see technology as our savior. Some even propagate the idea digital immortality—your digital handprints on the Internet will outlive your physical life.

Technology is not an independent force but an extension of our bodies and minds. It helps us reach our goals and actualize our values, whatever they may be. Technology may have realized the industrial efficiency paradigm, but there is no reason that it must be so. Ever since people started using tools, technology has contributed to our material well-being and increased our control over natural processes. Progress has accelerated over the past three centuries. What kind of world would we create if as much effort were devoted to using technology to surpass our mental and social limitations and the limits related to our individualism and communication? There are limits to growth (Meadows et al. 1972), but there are no limits to learning (Botkin et al. 1979). The Internet could be used as an instrument for continuous renewal of human activities and efforts to surpass global challenges. The prerequisites, however, are huge, starting from global consensus and the will to enable collective intelligence to act on such an agenda.

Efficiency and helpfulness in everyday lives are a fourth assumption prevailing in most narratives of the future of the Internet. Due to digitalization and the breakthrough of the ubiquitous Internet, networks will free an abundance of latent resources. Digitalization is seen not only as a factor of efficiency; it also revolutionizes the production of goods. Production methods and production organizations based on digital technology are expected to spark a third industrial revolution (Rifkin 2014). The roots of the first stage of industrialization go back to the eighteenth century, when machines took over some of the work previously done manually. The second phase started in the early twentieth century, when the invention of the conveyor belt and reorganization of work (in factories) enabled mass production. The new paradigm of digital production processes, which is just kicking off in industrial production, marks a shift from mass production to decentralized, specialized, tailored, complex, and skill-intensive production (Rifkin 2014).

Digital production methods make it financially feasible to produce small batches and tailored products for the market. Thanks to digitalization, production will also

become more flexible and geographically dispersed, the need for labor in manufacture will decrease, and the role of design in production will grow. Besides digital technologies, the new production paradigm encompasses new materials and production tools, such as 3D printers and easy-to-use, advanced, and more affordable robots. The organization of production will be based on network clusters utilizing peer production, open services related to open production, and physical production clusters that will help to make global production networks local again (Rifkin 2014). We will see more innovative, world-transforming, and culturally significant multidisciplinary production clusters related to industry, research and development, subcontracting, design, and art—following in the footsteps of Silicon Valley (Perry Piscione 2013; Kenney 2000).

A final assumption invariably connected to future images of the Internet is the emerging idea of the inevitability of the fusion between humans and machines. Exponential technological development is anticipated to end in the convergence of humans and machines, a trend which has just begun. According to Hammond (2012), within the next 25–30 years, researchers will develop a computer that has an intellectual capacity similar to that of humans. In his view, since progress is exponential, artificial intelligence will soon be twice as intelligent as people, then four times, and so on. Computers will also help themselves develop, thus further accelerating the progress. Around 2050, we will reach the technological singularity, a focal point in progress, from which technological development could shoot off in any direction, since artificial intelligence will have exceeded the capabilities of humans (Kurzweil 2005). The ethical questions arising from this assumption are: How do you build morals and ethical thinking into a machine? Will computers be the next step from humans, perhaps even superseding them? Does the future need humans at all? (Joy 2000).

We have always been technological animals, but humans and machines have only just started to converge. We will become more dependent on machines, and they will shape our thinking and perceptions of the world. Cloud services becoming more common marks a change in the way we assimilate information: we will not need to know everything, because we can always ask Google.

A human is by nature a psychosocial and cultural being. This makes Facebook and other online communities natural environments for people. Mobile equipment enables constant access to virtual realities full of symbols. However, these are not virtual symbolic realities cut off from the real environment but real, lived-in realities.

For many, the Internet represents democratic values. Anyone can have his or her voice heard on the Internet. A decentralized model of communication enhances this sense of empowerment. The uproar over issues related to democracy in 2011 is an example of the impending revolution. We have seen in practice how quick responses can be achieved through the Internet. However, the Net can also be used for utmost propaganda and manipulation. The hidden assumptions may quickly turn into illusions.

Three Alternative Scenarios for Future Internet

Bearing in mind the above reflections on the special characteristics, driving forces, and hidden assumptions concerning the future developments of the Internet, we may now sketch three alternative scenarios for future Internet. The most conspicuous trend is the continuous integration of the Internet into all areas and activities in society. How will this change the concept of the information society or knowledge society where the Internet plays a major role?

The future development of the Internet can be reflected upon through three tentative scenarios built around three core metaphors—instrument, communion, and organism. In each of the following scenarios, some drivers are accentuated more than others, and some hidden assumptions stand up in the scenario plot.

Infinite Instrument

The main drivers for this scenario are technological push, exponential growth thinking, and the techno-optimistic transhumanistic movement. The most influential hidden assumptions are the inevitability of human fusion with technology, and the quest for digital immortality.

This scenario refers to a technical platform or toolbox for diverse services and applications. This is the ultimate scenario of techno-optimists and transhumanists who anticipate that artificial intelligence will exceed the human brain in the next few decades. In this scenario, the Internet is an instrument that can infinitely enable humans to coexist and merge with machines. The Internet is converged with biotechnology, nanotechnology, and developments in the cognitive and neurosciences. The boundary between human and machines, as well as between virtual and physical life, is blurred. We are able to move between physical bodies and machines with the Internet providing the global gigacity of our avatars. Transhumanists have established huge, isolated, ideological communities, utilizing the Internet as a quasi-religion. They wish to have an impact on the whole society through advocating digital immortality and promoting its implementation via the Internet. The paradise they envision is ever-continuing digital existence and communication with other fellow digital immortals, as well as with living people.

In this scenario, there are huge differences in income and in access to the most sophisticated applications, which are costly. Techno-economic considerations form the prevalent logic: Huge investments in artificial intelligence are made, with little attention to looming risks and unintended consequences.

This is a possible future image of the Internet towards 2045. However, it is neither the most probable nor the most preferred one.

Cool Communion

The main drivers for this scenario are communication and connectivity—with all things and all the time. The most influential hidden assumptions are the belief in the necessity of the ubiquitous Internet and trust in the Internet as a fluent facilitator of everyday life. A person without proper access to the Internet becomes an outcast, as he or she would be excommunicated from the holy digital communion.

This scenario emphasizes social connectedness and communication between Net users. The Internet provides digital human space where the users are always *on*. An off-mode is no longer an option. This will have profound implications on people's daily activities and even thinking. You do not have to plan anything beforehand, since you can always find data online. Communion takes place in the cloud, since fifth generation (5G) wireless and cloud computing embody the lifeblood of the digital economy and society.

The network of production clusters has given rise to many new small- and medium-sized enterprises, which benefit from new materials, less expensive robots, more intelligent software, a higher number of online services and communities, and 3D and 4D printers. Moreover, one- or two-person microbusinesses operating from homes, garages, or shared premises are emerging. Thanks to new technologies, they can do things that would have been impossible before. The openness of data and the availability of technology have introduced new business opportunities. Entrepreneurship and open innovation inject creativity in the economy. This potential has been unleashed around the IoT. This means ultimate connectivity—everybody and everything is connected to each other. A better term would indeed be the *Internet of Everything*.

This future image of the Internet is a cornucopia of services, activities, and applications that make our everyday lives easier. The risks and threats of the use and development of the Internet have been taken into consideration. The Dark Net has simultaneously been growing, but new mechanisms of ubiquitous digital surveillance and crowdsourcing have strengthened our vigilance. All talk, texts, images, and other data are immediately tracked and monitored, as well as contextualized for interpretations. Regulation and control are often applied policies. This scenario is dominated by its ecological and political aspects. The IoT is launched to combat climate change and social inequalities. Digital democracy is spread worldwide to overcome authoritarian regimes (Watson 2012). However, cyberterrorism surfs on the same digital tsunami and is the new bubonic plague on global level, as the community would collapse together with the disruption of the Internet. This is a possible, and probable, future image of the Internet in 2045.

Opaque Organism

The main drivers for this scenario are ecosystems thinking and technology convergence. The most influential hidden assumptions are the belief in the symbiotic life between physical and virtual life. Fusion between humans and machines is embedded in the merger between humans, machines, and nature.

The third scenario is not as frequently implied a metaphor, but it may aptly refer to future key characteristics of the Internet. The Internet as organism is both a cultural and biological metaphor. The prevailing logic is co-creative biohumanism. The Internet is catalyzing a rhizomatic revolution towards a digital meanings society. The products, services, and practices that are planned, produced, marketed, sold, and used, exist as representations of the meanings embedded in them. A consumer that buys and consumes a product is in fact searching for a meaning and opportunity for express that meaning. Thus meanings become the main capital. Novel ideas are in constant demand. If you come up with an idea that can be turned into an innovation filled with meanings, you will be successful measured both in economic terms and social esteem. The core competence is understanding entities holistically. This is a hypothetical path of development that is worth following up. The ways that we gather, modify, create, and share data, information, knowledge, emotions, and entertainment, is changing, owing to digitalization and usage of the Internet. The rhizomatic theory of knowledge creation and sharing developed by French thinkers Deleuze and Guattari (1987) is dominant. In this model, the knowledge is not disseminated systematically or logically based on a hierarchical binary tree-model, but instead follows the organic way of rhizomes to grow in all directions, or water to run in all cavities around it. Even though the nearest surroundings of what is seen may seem blurred, it is possible to understand how the currents flow in the whole system.

The Internet has developed more and more into an independently active complex unit, resembling now a biological organism, containing pervasive human-technology interfaces. The computers connected to the Internet are filled with electronic blood that runs through the main processors as real blood does in the human brain. Brain-to-brain interfaces mean not only the merging of humans and technology, but intimate interaction between them and nature. Biological systems and processes are mimicked in technological solutions, not just as simulations, but also as deep immersion of all the three; humans, technology and nature. All the data, knowledge, experience and wisdom of nature, humans, and artificial technology is accessible to all. This has produced a totally new civilization—that of Netizens living in a digital meanings society. All is connected to all, and each unit (whether, human, city, nation, computer) understands its place in the ultimate ecosystem.

This is a possible, but perhaps not the most probable, future image of the Internet in 2045. It is, however, the most preferable of these three scenarios.

Conclusions

In this chapter, the development of the Internet is reflected upon through three core metaphors. The Internet-as-instrument refers to a technical platform or toolbox for diverse services and applications. The Internet-as-community emphasizes social connectedness and communication between Net users. The Internet-as-organism is

a less frequently applied metaphor, but it may aptly refer to future key characteristics of the Internet. The organism is, at the same time, a cultural and biological metaphor. The Internet could develop more and more into an independently active complex unit, resembling a biological organism, containing pervasive human/technology interfaces. In order to broaden the scope, new concepts are suggested alongside of the Internet of Things. If the Internet of Ideas, the Internet of Values and the Internet of Meanings are acknowledged, what would the merging between the concepts yield? According to Ruotsalainen and Heinonen (2015) media will continue to gain power in society in the future. The Internet is turning into a metamedium, used for multiple purposes—both individual and collective. The ultimate ethos of the Internet will be dictated by how our futures consciousness and global consciousness develop. Technological innovations and devices as such do not determine the future of Internet. Rather it is defined by how these innovations are used. This transformation will not happen automatically, but only through a reform of education. It is a question how people perceive the meaningful life, and how they can apply digitalization and the Internet to pursue it. The quest to knowing yourself and the search for meaning in everything you do will become a serious social goal and educational challenge. In the midst of global wicked problems such as poverty, violence, war, inequality, social exclusion, insufficient use of renewable energy, and environmental degradation, the rhizomatic Internet could provide sustainable solutions based on individual identity construction combined with futures responsibility. Such an Internet would provide the global heart of the digital meanings society, in symbiosis with the Global Brain.

The evolution of the Internet is intertwined with societal developments. Increasing access to and use of the Internet is a global trend, even though there are currently more than four billion people excluded, and thus relegated to the category of digital aliens. The future of the Internet was discussed in this chapter mainly from the social and cultural points of view, acknowledging the influence of technological traits and bearing in mind the systems approach and links to technical, political, and ecological dimensions. The third scenario Opaque Organism is the preferred one. It might have a chance to get constructed through global consciousness and conscious choice of a critical mass of human beings striving towards a meanings-orientated society. When will the threshold of the science-fiction type vision of telepathic and emphatic Global Brain be surpassed? Perhaps only when the level of our ethical capacity is matched with our data management skills. We are on the verge of a new stage in our historical development and in the development of the Internet. If we just understand our connectedness—everything is connected to everything—we are one.

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Chapter 6
An Internet of Beings: Synthetic Biology and the Age of Biological Computing

Aubrey Yee

Introduction

The future of the Internet may very well be squishy. And by that I mean, cockroach squishy, mosquito squishy, human tissue, and wobbly bacteria squishy. Those looking back at the history of the twenty-first century may very well mark it as the era of biotechnological convergence: the period of human evolution when the lines between technology and biology were finally and forever blurred beyond recognition. Future historians may ask how we got here, where else might we have gone if we had taken a different track, and if this was our destiny. "Both mythology and science have a voice in explaining how human beings and technology arrived at the juncture that governs our lives today" (Dyson 2012, p. 13). The convergence of certain disruptive technologies, including synthetic biology, artificial intelligence, 3D printing, nanotechnology, and interconnected global communication promises to transform both the way we understand what life is and the way that we live it. Imagine a time when a swarm of networked, synthetically produced, and controlled bacteria are released into the ocean to tackle an algae bloom and regulate ocean temperature. Or a time when the latest vaccine can be downloaded and printed out at home for parents to administer to their kids. Today, such musings are no longer relegated to science fiction. The pushes and weights of the futures ahead are many and varied, but there is one thing for certain: change is in the air, it is all around us, and it is going to be a very interesting time.

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Novel Science, Novel Challenges

The resonant effects of humankind's presence on planet Earth will profoundly define the twenty-first century. We have reached a point where the by-products of human industry and human lifestyle are affecting every planetary system from the smallest of micro to the largest of macro. Arising from the midst of this cacophonous fray are new and revolutionary technologies, including the emerging biotechnologies. Synthetic biology is a fairly recent phenomenon that aims to combine the previously distinct fields of biology and engineering. The guiding metaphor of the field is that of the *biological toolbox*: a treasure trove of genetic material that practitioners believe can be organized, measured, and mined for "cut and paste" novel biological creations. The potential ramifications of the coming synthetic biology boom are legion. On the positive side, we may be able to create synthetic fuels that solve our energy crises, find ways to grow food faster and cheaper, engineer life forms to conserve our planet's biodiversity, and grow organs to save human lives. On the downside, in the past, human beings have not managed complexity or international collaborative efforts very well. The scale of ethical harmony and coordinated governance required to navigate this transformative time with grace is beyond any that we have ever attempted, and the premise of synthetic biology is one of reductive science informed with neoliberal ideology in a capitalist society. Such a political economy typically leads towards a very distinctive sort of future based on corporate gain rather than common good. Some say we have found our ultimate purpose as a human collective: "To be caretakers of a planet, custodians of all its life forms and shapers of its (and our own) future…" (Anderson 1987, p. 10). Whether we are ready or not, we must now learn how to effectively govern evolution (Anderson 1987; Dator 2004). But is governance the right way to think about our relationship with emergence and complexity? Perhaps the very metaphor of control that has guided the scientific revolution is itself in need of a radical reconstruction. At the same time, the subversive science of ecology is being tested by a myriad of competing pressures including climate change and ever-expanding human populations. The Twenty-first century will be a time when we see whether a "viable human" arises from the chaotic environmental turbulence that we have constructed for ourselves (Berry 1999). As we have seen time and again, "Once domination is complete, conservation is urgent. But perhaps preservation comes too late" (Haraway 1990, p. 34).

Undoing the Nature–Culture Dualism

We live in a world that is primarily informed by a nature–culture binary. This cosmology stems from a Western, Eurocentric narrative cemented in the scientific and industrial revolutions. In 1637, Rene Descartes, often thought of as the father of this modern dualism, famously wrote, "And thereby we make ourselves, as it were, the lords and masters of nature" (Descartes 1999, p. 51). The trifecta of reductionist

science, colonialist imperialism, and globalized, neoliberal ideology has brought us to this very particular moment in time. We sit at a juncture of several potentially disruptive and game-changing technologies—and their convergence may serve to amplify the impacts even further. Yet we also sit at a moment where planetary limits are more visceral than ever. Climate change is beginning to wreak havoc, food and water are increasingly less secure for many of Earth's inhabitants and, by many accounts, we are in the midst of the sixth major extinction event, with estimates that we will lose 20–50 % of Earth's species by century's end (Kolbert 2014). Synthetic biology is precariously premised on the "myth of better," and it is a field rife with techno-optimism that remains, at this point, highly speculative. Startup companies flash bright website lights and promise us *better*: better medicine, better fuel, better food, and better living. But we must continue to ask: for whom, and at what cost?

What if better simply means the ability to do more of what we have been doing as a modern human species? Without addressing the inequality and suffering imprinted on the template of modernity, we merely promote more and more of the same. The scientific and technological revolutions that have emerged from this prevailing, bifurcated worldview have consistently supported a perceived boundary separating human life from all other nonhuman modes of existence. I say perceived because we have never in fact been separated from nonhuman forms of existence, physically or philosophically. The illusion of boundary, of separation, is perhaps the greatest categorical mistake upon which modernity rests. William Connolly argues that, as *Homo sapiens sapiens*, "We are not unique, we are merely distinctive" (Connolly 2013, p. 49). Peter Singer (2000) argues for a new political identity that he calls a Darwinian left: "It is time for the left to take seriously the fact that we are evolved animals, and that we bear the evidence of our inheritance, not only in our anatomy and our DNA, but in our behavior too" (p. 6).

It is increasingly apparent that the nonhuman multitudes comprise a majority of our physical human bodies. Our bodies contain some 100 trillion cells, only about 10 % of which are actually human. The rest are a mixture of bacteria, viruses, and other microorganisms. We know very little about how this vast and complex network of beings gets along (Stein 2012). Now we must embrace this complex human/nonhuman entanglement and become hyper-attentive to the fragility of our existence. Enhanced sensitivity to fragility and emergent complexity in this imagining produces a foundational ethics and capacity for visceral responses—what we might call gut reactions—that serve our higher purpose. In Hawaiian the term na'au is used to refer to the deep inner knowing that is imagined to emanate from the gut. Perhaps it is no coincidence that the obesity epidemic born of our modern addiction to cheap, processed foods has severed this, our most primeval tie to the nonhuman force fields surrounding us. So much so that some psychiatrists now prescribe probiotics to counter psychiatric disorders ranging from Obsessive Compulsive Disorder (OCD) to Attention Deficit Hyperactivity Disorder (ADHD) and many in between. "Microbes not only work on us, many become infused into our neurons and viscera to help *constitute* our very moods and performances" (Connolly 2013, p. 49).

In the twenty-first century, it seems that we are witnessing a crescendo of the nature–culture bifurcation through the rapidly evolving technological advances of

biotechnology and synthetic biology. These technological advances simultaneously call into question the boundaries between natural and synthetic, demonstrating that such categories are manufactured understandings of reality. As an increasing number of hybrid nature–culture assemblages become enmeshed and experienced, the delineation between where the preexisting ends and the manufactured begins becomes nearly impossible to decipher. Are we born or are we made? Ask this of a child born from a surrogate mother who was impregnated using donated sperm and in-vitro fertilization, and you realize that this question is rapidly becoming more difficult to answer.

The Challenge of Governing Evolution

The implications of emerging biotechnologies call into question existing frameworks of governance and ethics, which have historically been based upon physical boundary making and normative understandings of what it means to be human in the world. At the same time, the agency of nonhuman actors is being reconceptualized as a vital force in shaping arenas as varied as politics, economics, health, and even consciousness. "This is the project of the coming era: to create a social and political order – a global one – commensurate to human power in nature. The project requires a shift from evolutionary meddling to evolutionary governance, informed by an ethic of responsibility" (Anderson 1987, p. 9). I position this new materialism as a reconceptualization precisely because indigenous peoples have long understood, internalized, and often ritualized the integral relationships between life and matter, human and nonhuman. It seems that a new political imaginary, which embraces the political agency of non-humans, understands the effects of porosity and cross-border contagion, and invests itself in an ethics deeply informed by innovative aesthetic translations of the world, is needed to move us forward into the biotechnological era with grace.

With the transformation of bodies and life through the processes of biotechnology, we are being asked to question the very foundations upon which our systems of decision making, governance, and ethical imaginaries are based. For Eugene Thacker, this means reexamining "what constitutes a 'body'…how biological 'life' is defined…how emerging biotech fields are affecting our common notions of what it means to have a body, and to be a body?" (Thacker 2004, p. 1). These new ontological positions require bold moves away from the perspectives of cultural materialism, Marxist ecology, essentialism, and the dominant rationality of the scientific process that has prospered since the Scientific Revolution. Calling for a more symmetrical anthropology, philosophers like Descola (2013), Latour (2004, 2012), Bennett (2009), Stiegler (2012), Viveiros de Castro (1998), and Kohn (2013) aim to reexamine and subsequently reassemble the nature–culture bifurcation. The goal is nothing short of political transformation through embracing the foundational political entanglements of life and matter. The new vision is likely to resemble a network of diverse, complex, boundaryless and, ultimately, enmeshed assemblages.

It is time that we get comfortable with such ambiguity, fluid within the navigation of previously delineated borders and separations, cognizant and celebratory in the boost of reverence that is necessary to make these conceptual leaps. For Latour (2012), the "we" who have never been modern "did not designate a specific people or a particular geography, but rather all those who expect Science to keep a radical distance from Politics," and "we" are being asked to critically and honestly reexamine our genealogy (p. 8).

As we move along, we become more aware of, and affected by, modern ecological crises of our own making, the scope of which "obliges us to reconsider a whole set of reactions, or rather conditioned reflexes, that rob us of all our flexibility to react to what is coming" (Latour 2012, p. 7). Our somnambulant commitment to neoliberal ideologies has foreclosed certain capacities for flexibility that are natural to the human being. In a world where billions live on less than $1 per day, flexibility has given way to frailty. This lack of flexibility is a fatal handicap in a time of rapid and unpredictable change, but thankfully we have not been robbed of our ultimate creativity as emergent beings. The fact that so many *can* survive in this world on just $1 per day is assurance of the inherent and stubborn creativity of humanity. But it is our responsibility to finally, and publicly, acknowledge the fact that we have entered a new geological epoch, which is collectively being called the *Anthropocene*. First named by ecologist Eugene Stoermer, and widely popularized by atmospheric chemist Paul Crutzen in the early 2000s, the Anthropocene era is defined by the fact that human activity and influence is significant enough to have permeated every aspect of living and nonliving matter, from the macro to the micro, on our planet and even beyond into space. The extensive saturation of human influence brings great responsibility, which humankind is not sufficiently prepared for at the present moment. In this new epoch, "Governance is inextricably connected with the growing human responsibility for all the things the word evolution implies: the survival and extinction of species, the changing ecology of the planet, the biological (and cultural) condition of the human species itself" (Anderson 1987, p. 1). Our investment in the neoliberalization of life, the privileging of commodification as a primary means of value-making, and the implications of the fantasy of an apolitical, static *Reality* made knowable through the lens of scientific knowledge have led to a situation where multiple systems (social, economic, environmental, and political) are currently primed for either collapse or transformation. We are at a point where it seems the center will no longer hold. To navigate the brink of systems collapse, we must look honestly at our politics, create new metrics of value, and enliven the subjectivity of various modes of existence with their due philosophical and emergent weight.

> It thus hardly makes sense to oppose, as modern epistemology does, a single and true world, composed of all the objects and phenomena potentially knowable, to the multiple and relative worlds that each one of us creates through our daily subjective experience. (Descola 2013, p. 78)

The current and future flurry of biotechnological innovation is trending towards neoliberal logics that are based on ethics of commodification and governance structures invested in traditional nation-states, physical borders, boundary-making,

control, and surveillance. I believe that these trends deserve rigorous examination and reconsideration for the futures if we are to take seriously the agency of nonhuman life forms and the responsibilities implied in governing evolution. Coexisting, coproducing, overlapping, and always relational, the fractal structure of reality is thus understood as always in a state of flux with no beginning or end, where traditional practices of separation and boundaries no longer make sense. In this space we can begin to embrace the possibilities and openings provided by alternative worldviews, such as the "perspectival reality" of Amerindian thought which demonstrates how "the world is inhabited by different sorts of subjects or persons, human and nonhuman, which apprehend reality from distinct," and equally real, "points of view" (Viveiros de Castro E 2012, p. 45). The seminal question to be asked of those attempting to govern evolution is: just because we can, does it mean we should?

Driving Forces: The Pushes and Weights of the Future(s)

Synthetic biology is an emerging field with all the growing pains that are implicated by youth. Simply defining the field has been an arena of intense debate. However, there are some more commonly referenced definitions originating from different scientific bodies:

> SynBio is the application of science, technology and engineering to facilitate and accelerate the design, manufacture and/or modification of genetic materials in living organisms. (European Commission 2014, p. 5)
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> Synthetic biology is the engineering of biology: the synthesis of complex, biologically based (or inspired) systems which display functions that do not exist in nature. This engineering perspective may be applied at all levels of the hierarchy of biological structures – from individual molecules to whole cells, tissues and organisms. In essence, synthetic biology will enable the design of 'biological systems' in a rational and systematic way. (Directorate-General for Research, European Commission 2005, p. 5)
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> Synthetic biology is the design and construction of new biological entities such as enzymes, genetic circuits, and cells or the redesign of existing biological systems. Synthetic biology builds on the advances in molecular, cell, and systems biology and seeks to transform biology in the same way that synthesis transformed chemistry and integrated circuit design transformed computing. The element that distinguishes synthetic biology from traditional molecular and cellular biology is the focus on the design and construction of core components (parts of enzymes, genetic circuits, metabolic pathways, etc.) that can be modeled, understood, and tuned to meet specific performance criteria, and the assembly of these smaller parts and devices into larger integrated systems to solve specific problems. Just as engineers now design integrated circuits based on the known physical properties of materials and then fabricate functioning circuits and entire processors (with relatively high reliability), synthetic biologists will soon design and build engineered biological systems. (Synberc n.d., para. 7)

At root, synthetic biology and the digitization of life is being fueled by the values and beliefs of reductionist science, a belief in the possibility of infinite growth, the narrative of *progress*, and a pervasive techno-optimism. I would like to briefly

explore some of the most interesting and prescient current trends and emerging issues in the field. With the speed of change we are experiencing, today's emerging issue is literally tomorrow's established trend. Simply keeping pace with the changes and innovations is in many ways the most important and challenging aspect for the governance of synthetic biology.

Trends and Emerging Issues

The Wild World of Standardized Parts: Open Source?

How synthetically produced lifeforms will be owned and controlled is an incredibly important debate that has emerged in the beginning of the twenty-first century. First envisioned by researchers at the Massachusetts Institute of Technology (MIT), BioBricks and the iGEM competition (International Genetically Engineered Machines) are two of the foundational organizations leading the open source trend in synthetic biology. BioBricks parts are DNA sequences that conform to a set standard and can be accessed via The Registry of Standard Biological Parts. Think of Legos made of biological material that can, ideally, be put together in endless combinations to create different lifeforms. As people find new parts, they add them to the registry for others to use. The iGEM competition takes place once a year and brings together students of synthetic biology from around the world to compete. Each team builds something unique using the BioBricks parts to solve a pressing problem. Some of the ideas generated from recent iGEM competitions include a probiotic pill that could prevent heart disease and a synthetic bacterium that turns off the antibiotic resistant gene in MRSA, staphylococcus aureus, which causes staph infections leading to numerous deaths each year. Biohacking is another manifestation of open source synthetic biology. Groups like Biocurious in San Francisco and GenSpace in New York City host open lab spaces where curious neophytes and more experienced citizen scientists gather to experiment with synthetic biology techniques and learn from one another. Whether these open source spaces of practice will remain so open is a critical question for the futures of the field.

Venture Capital: The New Darling

At the recent SynBio Beta conference in San Francisco, I sat in on a panel of venture capital fund managers as they discussed the qualities they look for when funding a startup. The numbers being thrown around were in the tens of billions of dollars (USD) for a startup venture looking to build and sell quickly on the open venture capital market. For all intents and purposes, synthetic biology is one of Silicon Valley's new darlings. And the US State Department has taken notice, too. The

Defense Advanced Research Projects Agency (DARPA), part of the US Department of Defense, recently unveiled a new funding stream through the Living Foundries project specifically for synthetic biology startups that have the potential to be world-changing ideas. A simple two-page abstract can get you in the running for USD $700,000 of unrestricted funds. The US government is doing their best to stay ahead of this rapidly advancing curve. Between 2009 and 2013, the number of companies conducting research in synthetic biology jumped from 61 to 192, while the number of universities doing the same went from 127 to 204 (Wilson Center 2013). The foundational neoliberal ideologies pushing this science into the future bring with them certain frameworks and a particular ethos, the politics of which are critical to the futures.

De-extinction: Absolving Our Guilt?

The Long Now Foundation, with their venture called Revive and Restore, is leading the way down the de-extinction pipeline. They, and other research groups around the world, want to see if extinct species can be brought back to life. There are several philosophical questions raised by these efforts. Why do we want to de-extinct any species? Is it for the good of the species? Or is it ultimately a means to resolve a nagging human guilt that lingers due to our mismanagement of the planet's vast resources? Perhaps both are true. The ability to reengineer species, and possibly resurrect the long dead, creates a host of ethical and practical issues. Beyond extinct species one can imagine that the market for certain species created by these same technologies—a cow that produces only Grade A meat or a chicken that lays 12 eggs a day—will likely be alluring for those looking to patent their biological inventions.

The "Cloud Laboratory": Synthetic Life Meets Just-in-Time Manufacturing

Based upon the metaphor of cloud computing, companies like Emerald Cloud Lab, Transcriptic, and others are combining the capabilities of robotics, machine learning, and synthetic biology to accelerate the research and design process for scientists and entrepreneurs. Transcriptic (2015) defines itself as "a remote, on-demand robotic life science research lab with no hardware to buy or software to install" (para. 1). Simply cut and paste the DNA sequence you want to test and upload it to the Transcriptic portal. The robots in their lab will do all the dirty work for you and send back the results. In this new paradigm, the scientist becomes designer and creator while algorithms and robots are tasked with the mind-numbing work of experimentation. Previously, a synthetic biologist would have to design thousands

of code experiments and run them through the process of creation and testing to see if they worked the way that was intended. Now, all of those tedious processes are being managed by robots and algorithms. The mythos of the cloud is important to consider. Just as cloud computing obscures the fact that there are still rooms full of physical computers and servers in a very real material world that must be powered, managed, and financed, a "cloud laboratory" is a real place with real machines, people, instruments, politics, and economies that must be understood and considered as part of a greater political economy of production.

Biological Teleportation

J. Craig Venter, synthetic biology's most visible proponent, has built what he calls a digital biological transporter: Essentially, it works like a biological fax machine. Ostensibly created so that 1 day we can upload the DNA of life forms found on Mars, for example, this machine would enable us to send the DNA from Mars to Earth in a matter of minutes to be downloaded, printed out and examined. On earth, this technology could be used for a host of things. One example is a home-printed vaccine. When a new virus is found, the vaccine is synthetically programmed using DNA coding software, and you can go to your home computer attached to your 3D printer and print out your very own vaccine to administer.

Convergence of Synthetic Life, Machine Learning and the Internet of Beings

On one hand, algorithms powered by machine learning can run experiments on novel DNA. In this way, experimentation is fast-tracked, fueled by the neoliberal desire for efficiency, and allows researchers to play around with different DNA combinations at an accelerated rate. The other side of this technological convergence is the capacity for synthetically produced beings to be powered by artificial intelligence. Add to this the capacity to network these beings via the Internet, patent them, and corporately control them, and we open a whole new world of privacy, patenting, surveillance and policing issues for the future.

Alternative Futures

The Manoa School of Alternative Futures was developed by Professor Jim Dator, whose decades of work in the field of futures studies led him to a few important conclusions. The first is that *the future* does not and cannot exist. Instead there are

always multiple, truly infinite, *futures,* all of which are possible at any time. By pluralizing the futures we force ourselves to consider alternatives and, by considering alternatives, we become more comfortable with uncertainty and more capable of managing change—critical skills in the twenty-first century. The second important thesis of the Manoa School is that any useful idea about the future should appear to be ridiculous. While not all ridiculous ideas will prove useful, we know that the future will look, feel, taste, and smell radically different than the present. So, if an image of the futures is not provoking some disbelief, it is very likely stuck in the tyranny of the present. The third useful thesis is that there are four primary archetypes of images about the futures. After analyzing thousands of images of the futures, Dator (2009) began to discern these archetypes, and they have yet to be debunked (though all are always welcome to submit revisions). The idea behind the archetypes is not to limit our thinking about the futures, but to create loose frameworks that allow us to begin to coalesce all the different possibilities into coherent scenarios that can be discussed and experienced.

The four archetypes of alternative images of the futures according to the Manoa School are:

1. *Continued Growth*—a vision that the world will continue along existing trajectories: economies will grow, populations will grow, and the systems in place now (for better or for worse) will persist and keep growing. This is the predominantly accepted view of the future, despite the fact that history is dominated by stories of upheaval and systemic change.
2. *Collapse, also known as New Beginnings*—this is a vision of apocalypse, whether partial or total. It is also the vision of decline, decay, and systems falling apart. What this archetype uniquely offers is the space to think about what comes after things fall apart and for this reason it is also often called New Beginnings.
3. *Discipline*—the movements towards sustainability, resilience, living within Earth's limits, and strict top-down enforcement to control chaos and drive society forward—these define the archetype of Discipline. Think dictatorships, the Transition Town movement, and other such efforts where humans have used strict control and management practices to keep society either growing at a reasonable pace or to avoid certain types of political, environmental, or social collapse.
4. *Transformation*—futurists are most comfortable in this space. It is the playground of science fiction, dreams of grandeur, and total transformation. The world in this archetype is barely recognizable by the standards of the present. Here, the future is a techno-optimist's dream, the singularity realized.

In thinking about the futures of a cybernetic, synthetic-biology-enabled Internet, I have decided to combine the four archetypes into two: Collapse/Discipline and Continued Growth/Transformation. I have made this choice deliberately because I think, at this juncture, these archetypes have begun to meld. The collapse of structures in society will be paired with attempts at discipline, some successful and some just plain desperate. But the two are inextricably interlinked. And on the other side of the coin, if we are able to manage the converging environmental, social, and

political crises that we face, and we do continue to grow, the emerging technologies of the present moment are so transformational that the end of this century will look and feel profoundly different from the present. What was considered transformational technology just a few years ago is commonplace today. Where it cost thousands of dollars to map one's genome just a few years ago, you can now have a full, custom genetic diagnostic done in days for a pittance.

I have positioned these scenarios in the year 2050 so that we may think about some of the shorter-term transformations that may actually be quite drastic and world-changing. It may be realized that we, in 2015, sat at an ultimate moment of bifurcation. Positive advances on certain pressing issues like climate change, species extinction, energy, food and water shortage, and worldwide wars may be able to push us through this tense moment into a future where technological advances can continue. On the flip side, these pressing issues may very well be our undoing. By 2050, we should have a much clearer picture of which path we have taken.

Grow/Transform: 2050

Should the trends of today continue and the convergence of technologies persist despite potential disruptions like climate change and energy shortages, the future of 2050 will be nothing short of transformational. But in this possible scenario, quality of life did not increase equally for all. The social and economic trends of today portend a future fraught with increasing inequality and suffering for many. The basic tenets of wealth accumulation in a neoliberal, capitalist system virtually guarantee a consolidation of material riches in the hands of a few. These few comprise both corporations as persons and individually wealthy families, both human and artilect, similar to the consolidated dynasties of the feudal past. With more than ten billion people on the planet, we have figured out how to provide energy using synthetic organisms combined with renewable sources. Only the rich, however, have access to these energy sources on a consistent basis. For many in the world, day-to-day reality remains as bleak, if not even bleaker, than it was in the early twenty-first century. Physically, emotionally, and economically sealed away in highly secured enclaves, the wealthy enjoy a sense of relative bliss. Synthetically produced and carefully managed environments provide clean air, environmental beauty, safety and security due to the grace of the managing corporate entity. Those living in a protected, synthetically produced compound purchase not only their home but also the rights to be a part of the greater community and enjoy the managed environment, water, clean air and other resources that the owners of the compound provide. The owning entity provides for all a citizen's needs, albeit at the cost of their privacy and allegiance. In truth, the very idea of privacy as a positive value will be a thing of the past. For those with adventurous souls, relocation to Mars to join one of the very new and very experimental off-Earth communities is a viable and enticing option. In the compounds, greatly increased longevity is commonplace for those who can purchase new organs, repair cancer cells, and upgrade their DNA whenever needed.

Material goods are provided on time, as needed, produced in home micro-factories and discarded to be re-consumed in bacteria pits or dropped in massive landfills in the nether-lands. The nether-lands beyond the compound walls are where the majority of the poor exist. These areas are populated with a disposable labor force of biological and synthetic beings that exist in a mode of basic survival. Here, the "have-nots" do not experience the relative luxury that others enjoy. Reduced to a feudal state of existence, the chaos of the nether-lands continues to serve as a productive ground of resource extraction for the corporations whose profits continue to amass and grow. In these areas, the natural environment has been decimated without the costly and tedious synthetic environmental replacements, and bleak environmental and social conditions persist. Shadow governments controlled by corporate interests prevail, feigning democracy. In this alternative future, the Internet is highly surveilled, highly controlled and only available to those who can pay heavy premiums to get their information out to the world. As an Internet of Beings arises from the convergence of cybernetics and biotech, the Internet merges with Cybernetically Networked Synthetic Beings (*Cybers*). The Cybers are protected by corporate patents with indefinite expiration dates, and patent infringement is strictly enforced despite the legions of hackers who persistently attempt to break the hand of the state. For those who have the capacity to enjoy the fruits of the biotechnological revolution, this future will seem fairly bright. For the majority who are left out of the rising biotechnological tide, conditions will be similar to and in many cases worse than what we see today in the world's worst slums and refugee camps.

Collapse/Discipline: 2050

After the confluence of climate change, economic upheaval, social/political unrest and a spate of public health crises served to undermine the planet's human carrying capacity, there are only some three billion people left on earth. Energy is scarce. The promise of renewable energy, biofuels, and the like never materialized in enough supply or fast enough to meet the rapacious needs of a growing population. What is left behind is a mishmash of repurposed technology providing occasional energy to regional, tribal collectives. The same is true for food and water, and while inequality is less stark than it once was, most people are equal in their lack of consistent supply of almost everything. Stringent control of resources is the norm. Governance is a mix of localized community councils and renegade martial law. Trade, bartering, and self-sufficiency yield basic goods, and most families provide the bulk of their own food and produce their own energy using repurposed technologies, jimmy rigging them the best they can. Those who live in zones of environmental regeneration—places where populations never reached great density and where forests, streams, and oceans have had some chance to regain balance—are doing the best. However, climate change has wreaked havoc on most natural systems and nowhere is food production, agricultural or wild, as good as it once was. A foreboding fear of starvation is never far from mind. Previously densely inhabited urban areas fare the

worst, with no rule of law and a lack of basic necessities for survival. In areas where indigenous populations flourish, there is a resurgence of subsistence practices based on traditional knowledge augmented by leftover technologies and experimental adaptations to the new climate realities. The Internet remains connected worldwide, although certain areas are dark for days at a time, and as infrastructure fails it is often not replaced. Networked communications are primarily used to share knowledge and information, to exchange ideas and arrange collaborative endeavors among disparate groups of people. Groups of people usually share access to one or two computers, which have been hacked together by repurposed technology found in the detritus of the past. There is virtually no commercial use of the Internet. Instead it is primarily a tool for sharing information and facilitating trade among disparate communities struggling to survive in a new reality. Synthetic organisms created during the wild biotech boom of the 2020s persist in the environment and are changing the ecosystems where they live, crossbreeding with other organisms and mutating over time in ways that no one could have predicted. For some, the situation is not so bleak. Where community bonds and relations are strong, the natural environment is relatively mild, enough natural water exists, crime is minimal, and food production is sufficient, there is a sense of relative peace and a decent quality of life. It is in these oases that civilization is being reborn with a renewed sense of purpose and ideas about community-based governance, shared ethics, and deep respect for the resources provided by the nonhuman world.

A Brave New Built World

Advances in synthetic biology have further blurred the distinction between beings that are built and those that are born. With the ability to build comes a whole new host of ethical, cosmological, and political challenges. Using the Internet today, it is incredibly easy to select standardized biological parts from a registry or download a complex strand of DNA code, rewrite it, add new or different functionalities, upload the new code and have that organism printed out on a laser 3D or 4D printer. Anyone with access and just a little bit of know-how can do it. The possibilities are truly mind-boggling, and we have only just hit the tip of the iceberg. The futures, however, are always uncertain. Dynamic forces conspire in different directions. Energy shortages are real and could hinder or halt the promises of revolutionary technologies. Social, political, and environmental pressures similarly may hinder our progress down certain technological trajectories. In this time of uncertainty, a grasp of *alternative futures* is more critical than ever. Our ability to navigate change and understand the ripple effects of our choices may mean the difference between bleak and bright futures. Technology does not exist in a vacuum and the political ecologies of technology as a function of society cannot be forgotten. Will we one day command legions of synthetic beings via remote cybernetic communication? It is quite possible. The next time you decide to squash the cockroach in your kitchen, you might ask yourself, who could be watching from the other side of the lens?

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Chapter 7
Infectious Connectivity: Affect and the Internet in Postnormal Times

John A. Sweeney

Introduction

Until 2011, the only thing notable about Le Roy, New York was that it gave birth to Jell-O and housed a museum in honor of the well-known, yet perhaps not very well-liked, American delicacy. All this changed when a group of teenage girls and one boy at Le Roy High School began displaying uncontrollable spasms, tics, seizures, and stuttering. At the peak of the outbreak, 20 people—including a few non-students—were suffering from Tourette-like symptoms. Local media coverage quickly turned into national news, and experts of various pedigree submitted myriad postulates—infections, environmental pollution, and Lyme disease were the most popular. An in-depth study by the New York State Department of Health concluded: "The health-care providers and public health agencies involved in this investigation consider this cluster of cases to be the result of conversion disorder/mass psychogenic illness" (New York State Department of Health 2012, p. 7). A diagnosis of mass psychogenic illness (hereafter MPI), which used to be known as mass hysteria, is not without controversy (or detractors), especially as the Diagnostic and Statistical Manual of Mental Disorders (hereafter DSM) offers no specific guidelines, which is to say that the diagnosis is entirely subjective, if not what is offered when nothing else comes forward. Indeed, the diagnosis is just as mysterious as the illness, and the public pronouncement of MPI did little to quell the media circus surrounding the outbreak, which only worsened the situation by serving as a contributing factor in the contagion's spread (Abbott 2014). As Dimon reports, "Some believe that the Le Roy outbreak was a direct result of videos posted to YouTube by Lori Brownell, a girl with

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severe tics in Corinth, New York, 250 miles east of Le Roy" (Dimon 2013, para. 56). Early reports note how the initial group of teenage girls to be affected were watching videos on YouTube and mimicking what they saw. At the height of the incident, Dr. David Lichter, a Neurology Professor at the University of Buffalo, commented to a local news station: "I think you do have the potential for people going online and witnessing other student's [sic] behavior, then I think this medium has the potential to spread it beyond the immediate environment" (Admin WKBW 2012, para. 3).

Dr. Lichter's prescient premonition seems to have come to fruition in Le Roy as Marge Fitzsimmons, a 36-year old nurse who had no direct contact with any of the students, started displaying the same symptoms, ostensibly contracted through social media, which was the primary means by which she accessed and acquired information and updates on the afflicted. Again, Dimon reports, "Facebook was not only increasing the spread of the illness to new people, it was also exacerbating the stress, and therefore the symptoms, of those already suffering" (Dimon 2013, para. 42). Reflecting on the Le Roy contagion and how future MPI outbreaks might propagate, Dr. Robert Bartholomew, a sociologist specializing in MPI incidents, put forward an ominous potentiality: one of "a far greater or global episode, unless we quickly understand how social media is, for the first time, acting as the primary vector or agent of spread for conversion disorder" (Dimon 2013, para. 8). How might one imagine such future(s) possibilities? A look into the past might be useful for thinking about future(s) possibilities.

In the summer of 1518, scores of people in Strasbourg took to the streets to dance. There was no festival or special occasion that inspired them to do so; they were inexplicably compelled. An unknown force drove some to their death, and this feverish plague struck suddenly and swiftly, engulfing the town and surrounding areas in terror. The Dancing Plague of 1518 was not the first of such pandemics to strike Europe in the Middle Ages, but it is one of the most notable and well-studied. What maddened 400 people into a dancing frenzy? As Waller (2008) explains,

> It was a hysterical reaction. But it's one that could only have occurred in a culture steeped in a particular kind of supernaturalism. The people of Strasbourg danced in their misery due to an unquestioning belief in the wrath of God and His holy saints: it was a pathological expression of desperation and pious fear. (p. 13)

Waller's speculation about the causes of the Dancing Plague are amongst the most well-regarded, but the author, who wrote two monographs on the 1518 incident, is also quick to point out how much remains unknown and that contemporary diagnoses of such phenomena remain decidedly speculative. Again, Waller notes,

> In an age dominated by genetic explanations, the dancing plagues remind us that the symptoms of mental illnesses are not fixed and unchanging, but can be modified by changing cultural milieus. At the same time, the phenomenon of the dancing mania, in all its rich perversity, reveals the extremes to which fear and supernaturalism can lead us. (Waller 2009, p. 625)

While Waller focuses on supernaturalism as a basis for situating the psychosocial conditions of the Dancing Plague that struck Strasbourg, others note a variety of epigenetic factors and variables, although everyone who writes on the Dancing

Plagues ultimately reverts to speculation on the psychosocial state of the inflicted dancers. As Donaldson, Cavanagh, and Rankin (1997) observe,

> A dietary, toxic or infectious component are all possibilities. However, it seems to have been a psychological disorder which occurred where there was a predisposing cultural background, and to have been triggered by adverse social circumstances a sign of times which have long past. (p. 204)

If cultural background is a contributing factor in such incidents, how might this help one understand what happened in Le Roy? Given the immense popularity and increasing ubiquity of social media, might this interface be considered a cultural background? What affects might unfold in future(s) incidents?

In spite of the meteoric rise of social media and unanswered questions surrounding incidents such as Le Roy, many, if not most, of the scenarios for the futures of the World Wide Web (hereafter WWW) refrain from engaging with affective phenomena. I have intentionally selected the less-used WWW designation rather than the Internet as the former identifies the primary, albeit not sole, means by which digital information is accessed and shared rather than the physical infrastructure, although one clearly needs the other to subsist. This is not to say that this analysis is agnostic with regard to the massive technical constructs that are necessary to upload a video on YouTube or share a Facebook status using one's smartphone, quite the contrary; none of these actions could or would exist without accelerating advancements in the Internet's materiality, which has its own set of affects, but most who access the WWW have little contact with such mechanisms beyond the illuminated screens of various size in front of them. As Galloway notes, "The open-source culture of new media really means one thing today, it means open interfaces" (Galloway 2012, p. 9). And it is precisely the radiant screen in front of us that *affects* us most, which is to say that humanity is itself an open interface – one beholden to a range of affects, including infectious connectivity.

Offering a useful framing of affect that distinguishes between emotion, feelings, and the very context for infectious connectivity, Massumi argues:

> Reserve the term "emotion" for the personalized content, and affect for the continuation. Emotion is contextual. Affect is situational: eventfully ingressive to context. Serially so: affect is trans-situational. As processional as it is precessional, affect inhabits the passage. It is pre- and post-contextual, pre- and post-personal, an excess of continuity invested only in the ongoing: its own. (Massumi 2002, p. 217)

Affect has become a popular concept in theoretical circles as it points toward our inherent plasticity as "porously open systems" (Dator et al. 2015, p. 3). As Hemmings explains, "[Affect] is transferred to others and doubles back, increasing its original intensity. Affect can thus be said to place the individual in a *circuit* of feeling and response…" (Hemmings 2005, p. 552). In challenging the hegemony of agency, affect suggests a host of social and political implications—the most profound of which is that our brains and bodies are so highly susceptible to a range of epigenetic forces that the very categories used to designate individuality—in many places, the basis for rights and citizenship—are, at best, ambiguous, if not entirely arbitrary. In our all-too-modern world, this plasticity is integral as a cause and effect

of infectious connectivity. For many, infectious connectivity is the nagging impulse to check your e-mail; the desire to click the refresh button on your social media feed when you have just loaded the page; the frustration of tossing and turning at night only to be comforted by the soft illumination of a familiar screen. For others, infectious connectivity is what happened to Marge Fitzsimmons; the neurosomatic impulse to live away from the modern world; the push of a digital future, the weight of an all-too-human past, or something in-between that can and might shape what lies just over the horizon. Infectious connectivity, then, is affect incarnate—the trans-situational context for our all-too-human bodies engaging with "mutative" media in the extended present and a range of alternative futures (Dator et al. 2015).

Can *affect* explain the outbreak in Le Roy? Does the WWW have the capacity to infect someone? Could infectious connectivity be exploited or perhaps even weaponized? While some scenarios for the future of the Internet focus on e-health (Burns and McGrail 2012) and many more entertain a host of possibilities on cybersecurity (Burns and McGrail 2012; Creech et al. 2009; Rueda-Sabater and Derosby 2011), few, if any, confront the implications of infectious connectivity, even though such interests have become a focus for those seeking to profit from our all-too-permeable humanity. As Sampson reports, "Infectable emotions, feelings, and affects have in effect become the favored focal point for experience designers and neuromarketers" (Sampson 2012, p. 32). From the Facebook-approved, yet covert, experiment on users' emotions (Kramer et al. 2014; Meyer 2014) to the advent of Internet fasting camps in Japan (Samakow 2013), the affective impact of the WWW has never been more felt.

Using the lens of Postnormal Times to investigate the WWW's infectious connectivity, this study deploys a new foresight method to explore the emerging forces and issues pushing and weighing the WWW in the years to come. Developed in 2010 by Sardar, the concept of Postnormal Times argues that we inhabit "an in-between period where old orthodoxies are dying, new ones have yet to be born, and very few things seem to make sense" (Sardar 2010, p. 435). This global phenomenon is experienced in highly localized ways and does not suggest that there is such as a thing as "normal" in an absolute sense; rather, it aims to provoke a critical look at normative constructs and perceptions while illuminating the often implicit sense that many, if not most, have about ongoing changes in the present and what lies just over the horizon.

How Are Postnormal Times?

In late September 2013, unit three at the Oskarshamn nuclear power plant in Sweden was forced to shut down. As the world's biggest boiling-water reactor and the largest nuclear facility in the Nordic region, Oskarshamn's sudden closure raised more than a few eyebrows, especially in the wake of the ongoing, which is also to say unresolved, Fukushima crisis. While workers at Oskarshamn were quick to dispel the possibility of a meltdown on the Baltic, the cause of the stoppage is actually far more troubling: a massive bloom of Moon jellyfish clogged the site's intake piping, which

provides cool water for the 1400 MW unit (Guilford 2013). While the Oskarshamn incident received significant media attention, this is not the first time that jellyfish, which are actually not fish but rather invertebrates, impacted unit three's operations. In 2005, Oskarshamn, which provides roughly 10 % of Sweden's power, was forced to power down for the same reason. This phenomenon has not been limited to Oskarshamn as massive blooms have created similar shutdowns at nuclear facilities in the USA, Israel, Scotland, and Japan. In addition to wreaking havoc on power grids, jellyfish have also prompted the relocation of major film productions and caused headaches for the organizers of oceanic sporting events, including Sydney's Olympic Committee, but the recalcitrant invertebrates are also known for undermining the world's largest military and fomenting political tension (Sweeney 2013).

In 2006, the *USS Ronald Reagan*, which at the time was world's most advanced naval vessel, experienced what the Commander of US Naval Air Forces called an "acute case of fouling" while docked in Brisbane, Australia (Gershwin 2013). Although the ship and her 6000-person crew have the tactical capability to engage a small country, a jellyfish bloom clogged the *Reagan's* coolant system forcing the shutdown of all on-board activities and sending the ship back to sea. In 1999, the meddlesome invertebrates led to the closure of the Sual coal-fired power plant in Luzon, Philippines. The brief blackout left 40 million without power and incited "fears that a long-rumored military coup d'état was underway" (Tucker 2010, para. 1). Although the power was only off for about 10-min, President Estrada issued a statement ensuring the public that the blackout was "not part of an attempt to destabilise the government" ("Dark days for Estrada" 1999, para. 2).

Perhaps what is most troubling about these weird occurrences is that they are expected to multiply as the convergence of overfishing, marine pollution, and rising oceanic acidity and temperature levels, which are all the result of human activity, create favorable conditions for more blooms, especially near coastal areas, which is where one can find many of the world's 430 commercial nuclear power plants (World Nuclear Association 2015). In response to these incursions, scientists from the Korea Advanced Institute of Science and Technology (KAIST) designed the "Jellyfish Elimination Robotic Swarm" or JEROS. These autonomous jellyfish terminators are programmed to seek and destroy coastal blooms, which in Korea alone impact local fisheries an estimated $300 million a year (Gray 2013).

If anything, these weird events, as well as some of the responses to them, are signs that we do in fact live in postnormal times—an epoch where escalation has become common. As Sardar notes, the inspiration for Postnormal Times is Postnormal Science, which is

> characterised by high stakes, uncertain facts, disputed values and urgent decisions, hence the cost/benefit equation will invariably be fiercely debated. In these situations, peer acceptance is low or non-existent, theoretic structures are based on statistical processing and data input and the uncertainty tends towards ignorance. (Elahi 2011, p. 197)

Ultimately, postnormal times demand new modes of inquiry and analysis, if only to deal with the chaos, contradictions, and complexity of life in an era of recalcitrant uncertainty and accelerating change. As Sardar notes, "it is clear that the predicaments of postnormal times cannot be resolved with existing tools. They require new

modes of thinking and new way of doing things…" (Sardar 2010, p. 7). However, finding new and more efficacious ways of navigating postnormal times is easier said than done, especially when many, if not most, remain ensconced within the *manufactured normalcy field*. As Rao explains,

> There are mechanisms that operate – a mix of natural, emergent and designed – that work to prevent us from realizing that the future is actually happening as we speak. To really understand the world and how it is evolving, you need to break through this manufactured normalcy field. (Rao 2012, para. 4)

For Rao, the manufactured normalcy field is what keeps one from coming to grips with postnormal times, although phenomena such as climate change and jellyfish blooms are doing their utmost to catalyze a dramatic shift in thought and action. At the intersection of the chaos, contradictions, and complexity of postnormal times lies the *weirding* inherent to our historical moment. In this liminal state, it is impossible to go back to a state of manufactured normalcy—one cannot simply reboot one's perceptive attunement. With the above framework in mind, the Centre for Postnormal Policy and Futures Studies (hereafter CPPFS) developed a new method for analyzing emerging forces driven by the key concepts underlying postnormal times.

In conventional futures and strategic foresight work, the future is often divided into near future, medium future, and far future or, worse yet, high, medium, and low future scenarios. While this approach has been widely utilized for thinking about and modeling futures in the past (and the present), these divisions are too broad, too general, and too simple. They lack the requisite complexity of the world itself, and, thus, will always fail to generate truly new insights and novel queries. In postnormal times, one must think of alternative futures in terms of specific clusters of interconnected tomorrows—a complex ecology of possibilities for what might lie ahead. Furthermore, questions are far more important than answers, and Futures Studies has been plagued by an incessant drive towards strategic actionability rather than critical and creative analyses of the assumptions, blind spots, and manufactured normalcies that exert a tremendous influence in the here and now, the extended present, and in a range of alternative futures. As Sardar argues:

> It is no longer enough to simply explore a variety of possible futures; we also need to give serious attention to how we are going to navigate the postnormal condition … to reach sane and viable futures. On the whole, futurists have avoided big questions (normally seen as the subject of philosophy) and concentrated on analysing trends, horizon scanning, building global models and creating scenarios, visions, images of alternative futures. (Sardar 2015, p. 37)

As affect signals that which is most fragile about our porously open humanity, the degree to which we continue to be human in a variety of futures is crucial to this analysis. Another point raised by Sardar is critical for making some sense of what might lie ahead: it is no longer sufficient to talk about alternative futures as some phenomena, such as global warming, must now be included in all scenarios, even if only addressed in the past tense in light of as yet unthought remedies—this intentionally awkward designation signals a juxtaposition between that which is

unthinkable versus unthought, or that which forces us to think beyond our current challenges, paradigms, and assumptions. Jim Dator has recently made a similar point with regard to what he calls the "Unholy Trinity" (Dator 2009) and the "new normal" for the Manoa School scenario modeling method (Dator 2014). Hence, this study uses the intentionally awkward *future(s)* to promote a double reading of things to come. On one hand, there are always futures—a multiplicity of possible, however improbable and implausible, alternative futures. On the other hand, "the" future suggests a requisite commensality—a common space defined by collective challenges and opportunities situated firmly within the dynamics of Postnormal Times. The CPPFS developed *The Three Tomorrows: A Method for Postnormal Times* (hereafter 3T) to model these dynamics and provide a more robust methodological framework and approach for futures research. Providing a means to explore interconnected alternative futures scenarios of various scope and scale, 3T uses a single phenomenon or theme, in this case affect and the WWW, to investigate possibilities for what might lie ahead. As such, scenarios produced using 3T presence emerging issues and are meant to raise previously unthought concerns and questions.

Modeling 3T

The first tomorrow is simply the Extended Present: that is to say, the trends and developments one can identify today will shape the future of the next 10–15 years, and this is what most people mean when they use they invoke "the" future. This is not to say, however, that the Extended Present cannot be affected by the turbulence of postnormal times. But on the whole, change in the near future will be determined by the momentum of the present. In this period dominated by trends (mega- and otherwise) and populated with weak signals, Gupta's notion of the "black elephant" captures the essence of this horizon. He explains, a black elephant

> is an event which is extremely likely and widely predicted by experts, but people attempt to pass it off as a black swan when it finally happens. Usually the experts who had predicted the event – from the economic crisis to pandemic flu – go from being marginalized to being lionized when the problem finally rears its head. (Gupta 2009, para. 3)

Black elephants, then, are "in the room," so to speak, which is why they are integral to the Extended Present.

Beyond the Extended Present, one finds the Familiar Future(s), which exists beyond the next 15–20 years and, yet, has no definite time horizon. The Familiar Future(s) refers to scenarios for which we have (often mediated) desires (created by dominant images and metaphors around us), futures we may have worked for and/or negotiated, and futures consciously shaped or unconsciously realized. Inayatullah's notion of the "used" and/or "disowned" future resonates with this conceptual lens, but the Familiar Future(s) does not necessarily imply a negative or alienating context (Inayatullah 2008). The Familiar Future(s) is where most futures work and research is concentrated, especially since "images" or "imaginings" of the future remain at the

core of Futures Studies (Dator et al. 2015, p. 154). Scenarios developed to forecast or imagine the future(s) of the Internet—regardless of time horizon—fall squarely into this horizon. Taleb's popular notion of the "black swan" captures the essence of this tomorrow (Taleb 2007). In contrast to the black elephants of the Extended Present, black swans in the Familiar Future(s) are not perceptible or articulated, even by experts, which is to say that they can and might appear seemingly "out of the blue" but, as Taleb notes, they do make sense in hindsight.

Finally, the Unthought Future(s) constitutes the third tomorrow. These futures remain outside the framework of current thought, and this tomorrow forces one to reexamine the very premise of one's worldview and the assumptions underlying our preferences for what might lie ahead. As such, the Unthought Future(s) is a radical space of pure possibility—it is not unthinkable, as the title suggests, but rather a space populated with seemingly infinite alternative futures. Anything goes, so to speak, in the Unthought Future(s), and there are always questions to be asked about this future(s). In order to account for this dynamic, I developed the notion of the "black jellyfish" to capture the essence of this horizon.

As the introductory examples sought to demonstrate, postnormal times demands that we attend to the complexities of both large and small phenomena. As with the black elephant and the black swan, black jellyfish are "high impact," but they are "normal" phenomena driven towards a postnormal state by positive feedback—or increasing growth leading toward systemic instability. As Sardar explains:

> Since everything is linked up and networked with everything else, a break down [sic] anywhere has a knock on effect, unsettling other parts of the network, even bringing down the whole network. Moreover, the potential for positive feedback, for things to multiply rapidly and dangerously in geometric progression, is enormous. This is where those small, insignificant, initial conditions come in: they can trigger major upheavals, even a small change can lead to collapse with accelerating speed. (Sardar 2010, p. 438)

When put side-by-side, black elephants, black swans, and black jellyfish form the core of analysis within 3T, and constitute CPPFS's menagerie of postnormal potentialities. The next three sections outline some black elephants, black swans, and black jellyfish pushing and weighing the WWW.

The Extended Present's Black Elephants

In 2013, an online coupon site performed a survey of 2403 parents on gadget usage with small children. An extraordinary, yet perhaps unsurprising, 86 % of respondents admitted to using a smartphone to either pacify or babysit an upset child (Amodio 2013). Around the same time of the survey, the American Academy of Pediatrics released a policy statement entitled: *Children, Adolescents, and the Media*. The statement encourages parents to "discourage screen media exposure for children <2 years of age" (Council on Communications and Media 2013, p. 959). As the rising ubiquity of smartphones and tablets is a fairly recent phenomenon, there

are no long-term studies that can substantiate, or even speculate, on the far-ranging impacts or affects, although numerous calls have been made to remedy this oversight. Writing in the journal *Pediatrics*, Radesky, Schumacher, and Zuckerman (2015) contend,

> New guidance is needed because mobile media differs from television in its multiple modalities (e.g., videos, games, educational apps), interactive capabilities, and near ubiquity in children's lives. Recommendations for use by infants, toddlers, and preschool-aged children are especially crucial, because effects of screen time are potentially more pronounced in this group. (p. 1)

While the WWW's affects remain speculative, not all experts agree about what the increasing digitalization of play, if not life itself, for (most but not all) children portends. As Holloway, Green, and Livingstone (2013) observe:

> Children's advocates and media commentators tend to blame each new ICT technology (television, computers, gaming platforms, touchscreens) for the erosion of children's playtime – often without reference to other social and economic changes that have progressively eroded children's play time over the last few generations (Ginsburg, 2007). For instance, working parents tend to have less time to supervise outdoor play (McBride, 2012); generations of parents have progressively restricted the places or boundaries where children can play unsupervised (Louv, 2005; Tandy, 1999); and spontaneous play has progressively been replaced by adult organised activities (Skår & Krogh, 2009). This gradual reduction in children's play opportunities brings into question whether or not home-based entertainment technologies are the single, or even the major, reason for the decline in spontaneous play. (p. 20)

Given the constraints of the digital divide, which is to say that only half the world has ever accessed the WWW, the effects of increasing screen time appear to be decidedly provincial—unless Nicholas Negroponte's experiments in Africa scale-up.

In 2012, Negroponte's One Laptop per Child (hereafter OLPC) initiative dropped off boxes of pre-loaded Android tablets to two remote villages in Ethiopia. As Talbot (2012) reports, "The goal: to see if illiterate kids with no previous exposure to written words can learn how to read all by themselves, by experimenting with the tablet and its preloaded alphabet-training games, e-books, movies, cartoons, paintings, and other programs" (para. 2). Apparently, Negroponte's experiment "worked," and children began using the devices and accessing programs for learning, which was verified by technicians who collected the device's memory cards. By 2014, however, optimism turned into realism as reports of sharp drops in usage and poor results in other localities crippled the once steamrolling start-up. Focusing on OLPC's 570,000 laptop project in Uruguay, a report by researchers at Universidad de la República's Economics Institute found that the initiative had no impact "on test scores in reading and math. This result is consistent with estimates for Israel, Peru, Romania, Nepal, and the US (North Carolina)" (Mejía 2014, para. 8). Aside from the lack of impact on the educational development of OLPC's subjects, there is little, if any, evidence to suggest that OLPC took any precaution with regard to the affect that such devices might have in various sociocultural contexts. What infectious connectivity might arise from such interventions? As the child subjects of these experiments grow up, what affects might emerge?

The Familiar Future(s)'s Black Swans

There is no shortage of scenarios for the future of the Internet; in fact, a litany of studies producing a range of plausible, probable, possible, and preferable futures is readily available (Blackman et al. 2010; Burns and McGrail 2012; Creech et al. 2009; Rueda-Sabater and Derosby 2011). However, many, if not most, focus solely on the Internet, which is to say infrastructure and the various devices and services surrounding it, rather than the WWW's potential affects, but a few exceptions muse on the WWW's diffuse affects. The Oxford Internet Institute's *Toward a Future Internet: Interrelation between Technological, Social and Economic Trends* offers conclusions on future needs and directions by identifying 11 main drivers, including: "Environmental affects, positive and negative at personal to planetary levels" (Blackman et al. 2010, p. 91). Although the report mentions health services and healthcare repeatedly, it never makes an explicit connection between the WWW's various interfaces and the potentiality for a range of developmental and psychosocial affects, although a generous reading of the above driver could be extended to personal, environmental effects. In a similar vein, a report by the International Institute for Sustainable Development notes,

> While the energy and emissions issues currently dominate discussions about the footprint of the Internet, less obvious, but of considerable concern are the issues around materials consumption in the production of equipment and the related implications of e-waste, including exposure to and disposal of the hazardous substances contained in electronic products. (Creech et al. 2009, p. 12)

As most, if not all, images of the Internet's future focus on access, services, and infrastructure, Black Swans within this horizon ought to land within convergence of the WWW's possible affects and the aforementioned materiality of the Internet. Additionally, given the broad interest in securitization of the Internet—from personal privacy to cyberwar—generating a wildcard, which might act as a push toward the Familiar Future(s), within this sphere is critical. Sometimes, however, the best means of looking ahead involves analyzing past images of the future.

Zbigniew Brzezinski's *Between Two Ages: America's Role in the Technetronic Era* (1970) provides a sweeping take on a range of future possibilities. Noting America's transition toward a technetronic society, Brzezinski outlines the advent of a society "that is shaped culturally, psychologically, socially, and economically by the impact of technology and electronics—particularly in the area of computers and communications" (Brzezinski 1970, p. 10). Although Brzezinski's forecast does allude to networked communication technologies, his attention toward securitization and militarization are worth invoking and relate directly to this inquiry's interest in affect. Quoting Gordon J. F. MacDonald, Brzezinski writes:

> it may be possible – and tempting – to exploit for strategic-political purposes the fruits of research on the brain and on human behaviour … 'one could develop a system that would seriously impair the brain performance of very large populations in selected regions over an extended period'… (Brzezinski 1970, p. 28)

That Brzezinski's invocation of environmental warfare came at the same time that the USA engaged in covert cloud seeding missions during its engagement in Vietnam to produce more rain and thereby disrupt supply routes speaks to the prescient nature of his work and predilection for radical possibilities (Simons 2001).

One such radical possibility serves as the basis of a scenario devised by Dunagan, who writes, "Another devastating terrorist attack leads to not only total neural information awareness policies but legitimizes the wartime strategy of enemy mind control. Mind-altering drugs and weaponized neural technologies become standard military operations" (Dunagan 2004, p. 13). While the utilization of such technologies by statist—and specifically military—actors would not constitute a far stretch for one's imagination, or serve as an adequate black swan, especially given the CIA's rather colorful history of experimenting with fringe tactics and methods, such as project MKULTRA (Select Committee on Intelligence, and Committee on Human Resources 1977), the potentiality for a non-state actor with an aptitude for contemporary mediation technologies to undertake such an initiative using a range of WWW interfaces definitely fits the bill. What if the attention of non-state actors turns from securing nuclear, biological, and/or cyber arms to clandestine neurosomatic weaponry using existing WWW interfaces? Could one weaponize social media?

The Unthought Future(s)'s Black Jellyfish

Over the past decade, the population of Green Bank, West Virginia has swelled to 147 residents. While Green Bank's serene environs are reason enough to lure people seeking a slice of small town America, all of the hamlet's most recent transplants relocated due to the community's position within the National Radio Quiet Zone (hereafter NRQZ). Developed by the Federal Communications Commission in 1958 to facilitate an unobtrusive environment for radio telescopes, the 13,000 mile^2 NRQZ also houses military intelligence facilities. Thanks to severe restrictions on wireless Internet signals, the NRQZ has also become a safe haven for those seeking refuge from infectious connectivity. Although Electromagnetic hypersensitivity (hereafter EHS) remains an unrecognized medical syndrome, many report physical ailments—such as headaches, fatigue, and burning sensations—based on varying degrees of sensitivity to electromagnetic fields (hereafter EMF). For many EHS victims, there is no such thing as low-level radiation; even the minute doses emitted by smartphones are enough to bring on a range of painful symptoms.

But, as Stromberg reports, "the best predictor for whether a hypersensitive person will experience symptoms isn't the presence of radio frequency – it's the belief that a device is turned on nearby" (Stromberg 2013, para. 20). Furthermore, results of various provocation studies point toward the most elusive cause—affect. As Mild et al. explain:

> When provocation studies with foods, clinical ecology provocation/desensitization methods, household or industrial chemical agents, fragrances, and electromagnetic fields are

> conducted under methodologically sound double-blind, placebo-controlled conditions, symptom responses do not correlate with exposure. The implication is obvious; the perceived reactions are cognitively mediated. (Staudenmayer 2006, p. 45)

If EHS victims are not actually sensitive to EMFs but rather the perceived presence of EMFs, then the condition's pathology is acutely neurosomatic, which is another way of saying that EHS is an effect of infectious connectivity, which impacts various people—including some children—in different ways. As McCarty et al. report, "Within the limitations of the study, we concluded that we demonstrated the neurological syndrome in the subject we studied. The question of whether EMF hyper-sensitivity is a significant public-health problem was not addressed here" (McCarty et al. 2011, p. 675). It is impossible to analyze the potentiality for EHS becoming a "significant public-health problem" without indulging an array of conspiracy theories; however, this is precisely what the Unthought Future(s) necessitates.

Black Jellyfish are all about scale. They require that one take something small and imagine it on a much larger and more impactful scale. What if 10, 20, or 30 % of the global population experienced the symptoms of EHS? What if the dynamics and drivers underlying climate deniers and the more recent anti-vaccination movement were applied to EMF? In short, what if a positive feedback loop emerged surrounding the perceived—and not actual—effects of EMF? Could the NRQZ be expanded? Might the afflicted become refugees? How might national and international interests collide and compete over the public health implications? Such inquiries are very clearly not unimaginable, but the potential ramifications require one to confront the unthought.

Scenarios

The Extended Present

What began as the online grumblings of a few parents quickly mutated into a grassroots movement seeking answers. A mysterious pandemic has scientists scratching their heads and thousands of children in 27 countries displaying a range of abnormal behavior—from uncontrollable spasms to near-catatonic states. The only common denominator linking the afflicted is the utilization of a popular early-childhood language learning application, which became a global phenomenon in 2018. By mid-2019, the app had registered millions of downloads, although it instantly drew warnings from medical professionals concerned over its engrossing interface and addictive gameplay. Many esteemed scientists spoke out at the height of the buzz, but their informed concerns were drowned out as parents cheered the developmental leaps and bounds made by their children. An investigation by the Center for Disease Control has not yet returned any conclusive results, and political leaders have called numerous hearings in an effort to assuage irate constituents. Increasingly, protests are

turning violent as enraged parents take to the streets in anger. With high-level international meetings underway to discuss multilateral measures to keep the incident from spreading, some are already looking ahead to the next incident.

The Familiar Future(s)

Following the release of thousands of classified government documents in the wake of yet another whistle-blower scandal, one report on a covert government-funded program is reigniting anger amongst bereaved parents who lost their children during a mysterious pandemic that struck over a decade ago. Chronicling the government's involvement in aiding research and development of neuro-affective manipulation technology via a range of online media interfaces, which was later used to build innovative child learning applications, the report also notes how the technology was part of a cache of data lost during a massive cyberattack in 2028. Although this detail was buried in the initial news coverage, health providers and a number of veterans' groups have pressed for more information and swift action in light of the enigmatic neurological symptoms experienced by thousands of soldiers who served in Africa during a number of UN-led military operations in the 2030s. Compounding the situation, a prominent extremist group in the region has proclaimed the dawn of a new age of combat and exuberantly pronounced how "new weaponry" will secure victory and allow them to conduct large-scale offensive strikes abroad.

The Unthought Future(s)

When news outlets began reporting on the content of a recovered video from an extremist group announcing an attack on New York City using an unstoppable, invisible weapon, many, including senior government officials, immediately downplayed the threat. While the government responded with calm, the public response was fear. Fuelled by rampant speculation and wariness from suspicious outbreaks in the recent past, including damaging information from an array of leaked documents, panic transformed into phobia as thousands began to seek medical attention for an array of symptoms. Seeking treatment for everything from mild, yet recurrent, headaches to debilitating nausea, the afflicted refused to believe that they were well, even though many, if not most, were given a clean bill of health. Online support groups for the afflicted grew exponentially, driven by the hypothesis that shielding oneself from electronics, specifically Internet-enabled devices, would provide relief. What began as the migration of a few families quickly turned into the departure of thousands seeking refuge, and the government was forced to provide aid to the encampments, which were intentionally set up in rural areas. Communication with the encampments has been nearly impossible due to the strict anti-electronics rules and securitized perimeters of the camps.

Pushing and Weighing the Future(s)

> Affects are projectiles just like weapons; feelings are introceptive like tools. … Weapons are affects and affects weapons. (Deleuze and Guattari 1987, p. 400)

The public revelation of the Stuxnet virus, which was designed to cripple Iran's nuclear program, came as a surprise to many and garnered international media attention, and some declared its entrance onto the international stage a "declaration of cyber-war" (Gross 2011) and the arrival of a "cyber weapon of mass destruction" (Langner 2011). While Stuxnet was designed with a very precise target in mind, it has subsequently been released into the "wild" and has since infected a Russian nuclear reactor and the International Space Station (Shamah 2013). Writing on the nature of a computer virus, Sampson opines,

> The digital virus is, like a shipwreck or plane crash, understood as integral to the technology from which it came: an *accident of substance*. It is, accordingly, the invention of the network that "provokes" the accident because the potential to break down preexisted, *pre-force*, in the substance of its invention. (Sampson 2012, p. 119)

Much like the networks infected by a computer virus, our porous humanity is also prone to accidents, but affect as invited accident is only one way of reading the dynamics of the MPI outbreak in Le Roy, small children's exposure to and usage of WWW interfaces, the possibility of non-state actors deploying neurosomatic weaponry, and the potential scaling-up of EHS into a significant public health problem. There are other ways of reading these disparate, yet interconnected, phenomena.

All of the above phenomena are entrenched within the dynamic machinations of infectious connectivity, and each relies on neurosomatic exploits inherent to our all-too-human interfaces with contemporary WWW-Internet-based technologies, if only to be truly affective. Human beings have always employed tools to enhance the limits of our being in the world, but increasingly our tools are becoming more pronounced prostheses, which portend a range of radical, and perhaps unwelcome, possibilities—we are, then, perhaps more accurately "prosthetic becomings" whose very sociality has come to rely upon a range of things (Dator et al. 2015, p. 3). As Stone notes, "Prosthetic sociality implies new and frequently strange definitions of space, volume, surface, and distance; in prosthetic sociality the medium of connection defines the meaning of the community" (Stone 1994, p. 178). What if the medium of connection is infectious? What if some are compelled to connect just as some were compelled to dance in the streets of Strasbourg in 1518? The degree to which affect might act as a push versus a weight toward the future of the WWW/Internet remains to be seen, and one of the critical concerns of this analysis centers on how such events might unfold, which necessitates a more dynamic approach to alternative future(s) scenarios planning. While the queries posed might appear too big, complex, and insoluble, this is precisely what Postnormal Times demands.

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Chapter 8
Algorithmic Discrimination: Big Data Analytics and the Future of the Internet

Jenifer Winter

Introduction

We tend to think of the Internet as something virtual that we deliberately choose to access via our computers, tablets, and smartphones. In fact, the everyday world around us, including our interactions and inferred intentions, is becoming part of the Internet, often without our realization. The ongoing instrumentation of the natural world via a variety of wireless technologies, such as radio frequency identification (RFID) and near field communication (NFC), has enabled tiny sensors and actuators to connect billions, and soon perhaps trillions, of everyday objects to the global Internet. These technical and business developments have been heralded by corporations and governments as a means to promote economic and environmental sustainability and human welfare. Research and policy discussion has focused on benefits to sectors such as logistics, transportation, energy, and the environment, with visions of enhanced disaster relief, health care, tainted food recall, farming, and environmentally sustainable smart cities and power grids. These widespread images of the future promise greater efficiency, safety, egalitarianism, and personal convenience. However, critics have responded to this technoutopian narrative, voicing concerns about surveillance and accompanying undemocratic shifts in power, among a number of ethical and human rights concerns. Much of this is attributed to the growing consolidation of media power and the resulting influence on government regulation that has led to a restructuring of Internet standards and architecture, as well as available content. As Winseck (2003) notes, media corporations have been increasingly able to shape citizen use of the Internet. Even our identity is shaped through surveillance and control of information. This chapter examines key

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underlying technical changes related to the Internet, including the emergence of the social semantic web and linked data, the instrumentation of natural and social processes, big data and graphing analytics, and cloud-based facial recognition. Next, threats resulting from these developments—the erosion of privacy and merging of the public and private spheres, unjust algorithmic discrimination, and loss of anonymity—are discussed. In particular, these threats are linked to undemocratic shifts in power. Finally, three alternative scenarios for the future Internet are presented: *Galaxy of Things*, *Fractured Planet*, and *Yaoyorozu Redux*.

The Changing Internet

The Internet is frequently described as promoting innovation, freedom, egalitarianism, openness, and transparency of government activities. These visions acknowledge the ethos that guided Internet development for its first few decades, drawing on the values of the original open source programmers and hackers who created the protocols enabling the Internet's open standards, decentralization, and culture of creativity and online collaboration (e.g., Himanen 2001). While the technical logic and early cultural shaping of the Internet was free from centralized control or commercial interests, today's Internet operates under different rules, with power being increasingly consolidated into corporate and governmental hands due to informationalization. The "generativity" (Zittrain 2008) that characterized the early days of the Internet has been eroding for decades, and the future Internet may move away from this ethos completely. Instead, citizens face a loss of privacy and anonymity essential for autonomy and participation in a democratic society, and unjust algorithmic discrimination threatens to exacerbate existing social and economic disparities. While technological developments do not cause social change in and of themselves (Castells 2000, 2009), they enable it, and therefore shape our interactions and social structures. Below, several key Internet developments are discussed.

The Social Semantic Web/Linked Data

The social semantic web (Berners-Lee 2000; Breslin et al. 2009) is the emerging web of interlinked people and content enriched by technical standards that represent people and objects (and the links that connect them). Essentially, it is a series of machine-readable standards underlying social networking services. These developments are supported by the emergence of linked data, standards and practices for connecting structured data via the World Wide Web, creating a massive, global data space that can be navigated and processed by machine intelligence without human intervention (Heath and Bizer 2011). This machine-to-machine (M2M) processing and "intelligence" means that, through semantic web standards, computers can

increasingly understand relationships between data and perform routine tasks on our behalf. For the past decade, Web data have already included a "hodgepodge of sensor data contributing, bottom-up, to machine-learning applications that gradually make more and more sense of the data that is handed to them" (O'Reilly and Battelle 2009, p. 8). Kevin Ashton, who coined the term Internet of Things (described below) in 1999, states that a goal is to empower computers

> with their own means of gathering information, so they can see, hear and smell the world for themselves, in all its random glory. RFID and sensor technology enable computers to observe, identify and understand the world—without the limitations of human-entered data. (Ashton 2009, para. 5)

As machine-guided collection and analysis continues to grow, the scale and scope of data collection and analysis will be greatly magnified.

Instrumentation of Natural and Social Processes

Over the past 15 years, a growing number of sensors and actuators, including those in our mobile phones, chips embedded in our cars, smart appliances, and other common objects, have begun to blend seamlessly into our everyday environment. The Internet of Things is a paradigm encompassing a wide range of developments that enable everyday objects to be tagged and uniquely identified over the Internet (Uckelmann et al. 2010). Although there is no single definition for the Internet of Things, competing visions agree that it relates to the integration of the physical world with the virtual world—with any object having the potential to be connected to the Internet via short-range wireless technologies, such as radio frequency identification (RFID), near field communication (NFC), or wireless sensor networks (WSNs). This merging of the physical and virtual worlds is intended to increase instrumentation, tracking, and measurement of both natural and social processes:

> With so much technology and networking available at such low cost, what wouldn't you enhance? What wouldn't you connect? What information wouldn't you mine for insight? What service wouldn't you provide a customer, a citizen, a student or a patient? (IBM 2008, para. 11)

Corporations, such as IBM ("Smarter Planet") and HP ("Central Nervous System for the Earth"), and governments, including China ("Wisdom of the Earth") and the European Union, have embraced this vision, working to develop technical standards, business practices, and policy guidelines to foster its growth. Table 8.1 lists examples of Internet of Things applications that have been created or envisioned.

From the perspective of corporations and governments, the assumptions underlying this agenda are that, by networking billions or trillions of devices in the everyday environment, we can enhance business efficiency and enable continued economic growth, while making the world safer and more convenient.

Table 8.1 Examples of Internet of Things applications

Logistics	e.g., supply chain management (Ashton 2009); restocking; payment systems (Uckelmann and Harrison 2010; Atzori, Iera and Morabito 2010)
Health care/ biomedical	e.g., ambient sensors for independent living; implantable or edible medical devices (CERP-IoT 2010)
Environmental monitoring	e.g., natural disaster prediction, such as flood, fire, earthquake, and tsunami warning systems (CERP-IoT 2010); chemical and gas leak identification; pollution and temperature monitoring (Hvistendahl 2012); water potability testing
Security	e.g., motion-sensitive camera activation; access control; radiation monitoring (Ishigaki et al. 2013); intrusion detection (Khan et al. 2012)
Structural engineering	e.g., monitoring and identifying faults in buildings, roads, or bridges (Agrawal and Lal Das 2011)
Food safety and agriculture	e.g., testing (Hvistendahl 2012) and recall of tainted food (CERP-IoT 2010); monitoring hydration, chemical composition, or soil quality; livestock tracking (CERP-IoT 2010)
Smart cities, homes, power grid	e.g., infrastructure monitoring; management of smart grids to govern cost- and resource-efficient use of energy (Khan et al. 2012; Atzori et al. 2010); "Green ICT" to lower environmental impact (Vermesan et al. 2011); automatic lighting and power allocation (CERP-IoT 2010)
Transportation	e.g., aerospace part authentication (CERP-IoT 2010); sensor-enabled roads; assisted driving (Atzori et al. 2010)

Big Data and Graphing Analytics

The amount of data flowing over the global Internet each year (e.g., Web browsing, social networking, location, and video data) is poised to pass the Zettabyte (1,000,000,000,000,000,000,000 bytes) threshold by 2016 (Cisco 2014). For reference, one Zettabyte is also the estimated total amount of data to have traversed the Internet since its creation in 1969. "Big data" is the term used to describe large, complex data sets that require novel data management tools. The rapid increase of real-time user data (including many novel data types) has enabled sophisticated user modeling, and there are many efforts to mine and personalize this data (Jaimes 2010). *Big data is not just more data*. It relates also to the idea of "big graphs" that allow modeling and predicting human behaviors in their rich contexts of relationships, groups, and social influence. Governments and corporations have focused on creating sophisticated graphs of citizens' online and offline activities and aggregating these data with other sources, such as physical location, public records, and online search habits. These novel data types, coupled with enhanced data storage and analytic tools that link other personally identifiable records, enable the construction of unique profiles. Data has become an increasingly valuable commodity, and the rationale for increased gathering and analysis is linked to the idea of endless economic growth (i.e., job production and value-added services related to big data are offered as a new frontier to stimulate economic growth).

Cloud-Based Facial Recognition

Biometric technologies that enable one's face to be uniquely identified from a digital image, video, or in person are already part of the Internet. Sophisticated facial recognition technologies enable corporations, governments, and individuals to blend online and offline data via the convergence of social networks, data mining, and cloud computing, enabling near-instantaneous matching of subject images to online identity profiles (Keller 2011). For example, Acquisti et al. (2011) were able to match unidentified, pseudonymous profile photos of subjects from an online dating site with their Facebook photos, as well as matching students walking around college campuses with their online records using an Internet-enabled mobile device. Related technologies are already employed by large media corporations such as Facebook, and marketers are employing them in billboards, vending machines, televisions, and home gaming systems in order to gauge viewer affect and offer customized products (Wadhwa 2012). The Xbox One game console is accompanied by an accessory called a Kinect that uses a camera to track players' movements. The Sony PlayStation 4 also has an optional camera that performs a similar function (Ackerman 2013). Using facial recognition, Microsoft, Sony, game companies, and their affiliates know which individuals are watching television or playing a game, as well as a wealth of other personal information, such as who one is with, what they are watching or listening to, and perhaps even what is being said (via eavesdropping and automated voice recognition). Law enforcement agencies also employ advanced facial recognition systems, and they are a core component of the United States' Next Generation Identification program (Federal Bureau of Investigation 2014). It is expected that the sophistication and reach of these technologies will continue to grow as we move towards next-generation standards for the Web and increased data aggregation and mining. Proponents of facial recognition technologies argue that they will lead to increased security and enhance entertainment. Yet, even if one tries to avoid using the Internet, cloud-based facial recognition throughout the everyday environment enables the collection of personal data linked to a specific individual—and thus threatens both privacy and anonymity.

The Erosion of Privacy and Collapse of the Private Sphere

The combination of technical developments outlined above, along with the complementary capitalization of personal data, a lack of strong regulatory intervention to protect personal data in many parts of the world, and government demands for access to citizen records as a means to prevent terrorism, have led to an erosion of personal privacy and a blurring of the public and private spheres that have underpinned Western legal discourse about privacy for centuries. A dramatic increase in *personal* data collected, stored, and transmitted, coupled with billions of devices now capable of connecting to the Internet, has led to what the European Commission,

Information Society and Media (2008) refers to as a "data deluge" (p. 6). Governments and corporations, often with little or no restriction, use these data for business intelligence and consumer marketing. There is something fundamentally different-in-kind about this emerging datasphere. First, the Internet of Things relies on many tiny, often invisible, components. One does not know where or when data is being collected. Even where there are regulations requiring explicit opt-in consent, one will not know if these are being violated (Winter 2015). Further, even if opt-in consent were enabled, the difficulty of implementing such a privacy-protecting scheme would be overwhelming (e.g., think about how to handle thousands of pop-ups at the interface level). This aspect clearly complicates regulatory or technical schemes that rely on consumer consent. Further, billions, or trillions, of everyday objects, including the human body itself, will be equipped with sensors. This opens the door for a variety of new types of data to be collected—for example, the unique communication signature of a pacemaker or insulin pump, biometric data such as one's gait or keyboard strokes, and data from sensors placed nearly anywhere that could be geared to monitor nearly anything. Finally, all of this is part of a global Internet-based system. Data will be aggregated and linked to other personally identifiable records. Mining of big data will identify patterns that were previously not available for analysis—perhaps data that seemed innocuous or meaningless will now reveal associations we had no idea they could—and that might be harmful to us in some way (Winter 2014). Increasingly, global flows of information will make it possible for these personal data to be accessed by a variety of sources, either legally (e.g., lax regulation) or illegally (e.g., hacking).

For some time, advertising and marketing institutions have been aggressively looking for ways to "insert themselves unfiltered into their desired customers' domestic lives in ways that encourage consumers to accept surveillance and relationships tailored to their personal characteristics" (Turow 2006, p. 295) via direct marketing, product placements, supermarket loyalty programs, and customized media. The Internet of Things and big data analytics will only further enhance marketers' and advertisers' surveillance power.

In the face of these changes, some have claimed that *privacy is dead*. For example, in 2010, Facebook founder Mark Zuckerberg stated that privacy was no longer a social norm (Johnson 2010), a statement met with some resistance by citizens and scholars alike. Nissenbaum (2010) and boyd and Hargittai (2010), for example, highlighted the importance of understanding context when discussing privacy. In boyd and Hargittai's study, they found that "far from being nonchalant and unconcerned about privacy matters, the majority of young adult users of Facebook are engaged with managing their privacy settings on the site at least to some extent" (para. 51).

Ongoing concern about privacy transgressions and the surveillance capabilities of the Internet have led to growing recognition of a need for technical standards and governance to "build trust and confidence in these novel technologies rather than increasing fears of total surveillance scenarios" (The European Commission, Information Society and Media 2008, p. 3). In contrast to China and the United

States, the European Union has long had strict data protection regulation. These two approaches came into direct conflict in 2014, when the European Union revised its general data protection regulation, requiring lawful data processing to include explicit consent. Citizens of the European Union were also afforded the "right to be forgotten," as well as the right to port their data to other holders (Balboni 2012). These conflicting approaches may hinder global standards development—or data protections may be weakened and ultimately left by the wayside.

Unjust Algorithmic Discrimination

Data mining and profiling may lead to undesirable discrimination (Custers 2013), as big data analytics exposes sensitive behaviors or other personal information that could be used to disadvantage certain individuals or groups by corporations or governments. For example, citizens may experience political and economic discrimination related to housing, immigration, employment, political, or health-related behaviors (Winter 2014). What was once considered harmless chunks of information, such as your location at particular times of day, what you bought at the supermarket, what appliances are running in your home, or which individuals you spoke to or were in close proximity to at a certain time, can be used to discriminate against individuals in many ways. For example, companies might offer different services, products, or prices to individuals based on their data profile (Turow 2006, 2012; Winter 2014). Similarly, insurers are beginning to allocate risk differently due to big data analytics (Upturn 2014):

> A person's future health, like their driving behavior, can also be predicted based on personal tracking to set insurance prices. At an annual conference of actuaries, consultants from Deloitte explained that they can now use thousands of "non-traditional" third party data sources, such as consumer buying history, to predict a life insurance applicant's health status with an accuracy comparable to a medical exam. (p. 6)

Insurance is designed to spread risk across a large group of people, so new forms of price differentiation will place great burdens on those with certain medical conditions (or even a data profile indicating they *might* become ill). Differentiation may also lead to increased costs for healthy individuals in low-income areas or those who drive to work at night—and both groups are disproportionately populated by vulnerable social populations (Upturn 2014).

Even where discrimination is illegal—such as basing the approval of a mortgage based on one's race or family status—other, non-protected proxy information may be used to make the same decision to decline. Barocas and Selbst (2015) note that,

> Advocates of algorithmic techniques like data mining argue that they eliminate human biases from the decision-making process. But an algorithm is only as good as the data it works with. Data mining can inherit the prejudices of prior decision-makers or reflect the widespread biases that persist in society at large. Often, the "patterns" it discovers are simply preexisting societal patterns of inequality and exclusion. (p. 1)

As Haggerty and Ericson (2006) point out, networked surveillance allows corporations or governments to assign individuals to social groups and then monitor them, with the specific logic of that system subjecting individuals to varying levels of scrutiny. Lyon (2002) describes this differentiation as "social sorting":

> Codes, usually processed by computers, sort out transactions, interaction, visits, calls and other activities; they are invisible doors that permit access to or exclude from participation in a multitude of events, experiences, and processes. The resulting classifications are designed to influence and to manage populations and persons thus directly and indirectly affecting the choices and chances of subjects. The gates and barriers that contain, channel, and sort populations have become virtual. (Lyon 2002, p. 13)

Surveillance can also shape one's identity based on categories created by advertisers. An individual's position in this "new constellation of market segments" determines the commercial offers and communication one receives (Haggerty and Ericsson 2006, p. 16). In many cases, algorithmic discrimination unjustly harms individuals or groups who are already socially and economically disadvantaged.

Death of Anonymity

The current evolution of the Internet also threatens anonymity. There is a trend towards online identity verification, where corporations such as Google or Facebook attempt to link all online user profiles together via a "real name" policy. Unique identification allows the aggregation and mining of personal information, and users who resist may be disadvantaged by being unable to access services. As danah boyd notes, "the people who most heavily rely on pseudonyms in online spaces are those who are most marginalized by systems of power" (boyd 2011, para. 6).

Data that have been anonymized in order to meet regulatory requirements or to quell public concern can also be "re-personalized" via data mining techniques (Schwartz and Solove 2011). Angwin and Stecklow (2010) found that omnibus data aggregators have been exploiting technology that "matches people's real names to the pseudonyms they use on blogs, Twitter and other social networks" (para. 20). Many other anonymized large data sets have been compromised through reidentification. An early example of this was the identification of Thelma Arnold ("user number 4417749"), a would-be anonymous user of the AOL search engine. In 2006, AOL released 20 million anonymous Web search queries, and journalists were quickly able to identify Arnold based on her queries, many of which revealed private aspects of her life (Barbaro and Zeller 2006). In another case, Manfredi et al. (2014) examined the data set from the Telecom Italia Big Data Challenge, which included vehicle location and mobility data from Milan, and noted that "there is no known way to anonymize location data since spatio-temporal data is highly unique to individuals and robust to changes over extended periods of time" (p. 46). It was easy to uniquely identify drivers from just a few data points. In 2013, anonymous DNA sequences posted on Internet genealogy forums were linked to DNA donors based on publicly available data (Gymrek et al. 2013). In each of

these examples, the data were highly personal but thought to be harmless because they were "anonymous."

As awareness of corporate and governmental surveillance grows and anonymity and privacy are diminished, citizens have begun to self-censor. PEN American Center (2013), a national writers' group in the United States, surveyed members and found that they engaged in self-censorship in the wake of news about mass surveillance programs run by National Security Agency that include monitoring the activities of everyday citizens. As concerns about privacy invasions and lack of anonymity mount, citizens' freedom of access to information and their ability to discuss issues relevant to democratic decision-making in their communities is limited.

Democracy and Egalitarian Systems

Powerful technoutopian narratives champion the Internet as a catalyst for democratic discourse and increased political participation, a platform for the emergence of the "public sphere" as envisioned by Habermas (1991). Benkler (2006), for example, sees the Internet as an online public sphere, due to the increased feedback opportunities it affords. Hindman (2009), on the other hand, has found that existing power structures have only been reinforced through media consolidation that has limited the diversity of political discussions online. The feedback-rich environment possible via the future Internet, increasingly interdependent and self-organizing, certainly has unprecedented *potential* for grass-roots political action and increased citizen involvement in governance. However, while we are promised that the Internet will enhance democracy and promote egalitarian systems, the developments noted above have more often represented undemocratic shifts in power (Winter 2014). Given the commercial value of personal data, unethical uses of big data, and privacy concerns noted above, it is questionable whether the future Internet might enable meaningful citizen participation and governance. With technological innovation, we also need social innovation (e.g., meaningful participatory design and governance) to guide development of technical systems in order to protect ethical norms and strengthen civil society. Deliberative democratic processes which actively seek to involve members of the general population in the formation of policy are essential and require meaningful multi-stakeholder dialogue involving governments, businesses, and citizens.

Alternative Scenarios

To shift from a present-focused mindset and enable ourselves to explore, test, and evaluate alternative futures in the present, three alternative futures scenarios representing distinct possibilities for the year 2045 are outlined below: The Galaxy of Things, Fractured Planet, and Yaoyorozu Redux. Dator (2009) argues that there

are four fundamental archetypes for images of the future: Continued Growth (often "Continued Economic Growth"), Collapse (due to internal or external forces), Disciplined Society (focusing on survival and fair distribution), and Transformation. In this chapter, I have combined Continued Growth and Disciplined Society into a single scenario to explore the tensions between them. These scenarios are not intended to reflect *probable* futures; rather, they present contrasting possibilities for the future Internet in the year 2045. They are designed to highlight critical concerns and opportunities related to the Internet and to help foster fruitful dialogue in the present.

The Galaxy of Things

In 2045, what we once called the Internet is now truly *everywhere*, or at least in nearly every natural or manufactured thing, including our bodies, the Mars colonies, and several automated research stations on Saturn's moons. The integration of nanotechnologies and other materials science innovations took us by surprise—after years of hearing promises about proximal future applications, we suddenly realized they were all around us. Looking back, it seemed to happen overnight. In the early 2000s, amidst fears of "terrorism," many had argued that privacy was irrelevant, selfish even. Even more, as evidence of humankind's destructive influence on the natural systems of the planet became irrefutable, over 150 nations, including the United States, members of the former European Union, China, Russia, and Brazil, ratified the Calcutta Protocol (named after the first large city to be to destroyed by rising sea levels) in 2027. Subsequently, any resistance faded, and we acquiesced to demands for systems such as the smart grid and homes and "green" city infrastructure that strictly measured and managed our energy consumption. As China exerted its political and economic might as the world leader of sensor networking technologies and standards development, privacy regulations were quickly relaxed. Soon, there were no restrictions on the collection or analysis of personal data by government or corporate entities. Law enforcement's encroachment upon personal data was increasingly upheld by the courts. Global media enterprises continued to consolidate, and the ubiquitous deployment of near-invisible sensors led to a high degree of social transparency. The "private sphere" faded from existence, a relic of history embedded in archaic laws that were no longer enforced or were entirely removed.

Sharing our data was helping the planet and seemed harmless enough at first. After all, who would really care about such minutiae as what appliances we were using or what route we took to work? What harm could come from these tiny snapshots of daily life? Looking back, it seems obvious that corporations and governments were basically the same thing, or at least working in tandem. Soon enough, biometric technologies made it near-impossible to travel, purchase items, or meet others without notice. Today, no one comes to arrest us for dissent, because speaking out is futile, and few dare risk it. Even thinking about it seems

dangerous due to the predictive power of the network intelligence. We are frequently reminded that decisions based on automated systems and complex algorithms are fair, as they lack human bias. In reality, long-standing social and economic injustices seem to have increased. While many people have their most basic physical needs met, citizens are rewarded based on adherence to the "common good," and subtle punishments are meted out to anyone who deviates. The latter receive disincentives in the form of higher prices and interest rates, reduced energy access during peak times, availability of certain jobs, and many other things. Mostly, we are safe, as long as we accept our enforced identities.

Fractured Planet

In 2045, access to the Internet is a luxury enjoyed primarily by the military elite and the super-wealthy. Even so, it's not too reliable and hardly global. By 2018, governments faced a substantial backlash as citizens banded together to oppose oppressive surveillance regimes and policies that exacerbated the digital divide. Numerous environmental disasters brought about by human activity quickly silenced this. As Calcutta, Guangzhou, Miami, Shanghai, New York, and other coastal cities began to disappear beneath the waves, even the most recalcitrant naysayer understood that climate change was real. As regions around the world were devastated by megastorms, any resistance towards collection or analysis of our personal data was quickly silenced. After the passage of the Calcutta Protocol in 2027, corporations and governments focused on energy conservation and ecosystem monitoring via the "Intelligent Earth" strategy. This was an aggressive, Internet-of Things-enabled solution to combat global warming. In addition to deploying sensors throughout the natural and built environments, great strides were made in geoengineering and weather modification. Clouds of nanoscopic smart particles were released into the atmosphere to combat global warming. Any dissent based on concerns about possible health effects were drowned out by media sources declaring these changes to be "green" and essential for survival.

Whistleblowers soon revealed that weather modification was actually used by militaries to control the weather in battlefield conditions, and the process was also poisoning the environment by shedding toxic particles. The true goal had been the militarization of space. In addition, the "Intelligent Earth" strategy did not have the desired environmental impacts; it increased surveillance and military power while, in many cases, *increasing* energy use. As climate change continued to spin out of control, states involved with the Calcutta Protocol refused to acknowledge this policy failure, and no meaningful changes were implemented. Increasingly powerful military regimes (targeting each other) and disgruntled citizen hackers (targeting the military and other elites) engaged in cyberwarfare, effectively crippling Internet services in various regions. Since most data are stored in the cloud, these numerous security breaches and data outages led to a fractured series of smaller networks. Furthermore, amid these tensions, national powers argued over standards related to

the Internet of Things, leading to additional disruptions. This halted the provision of many essentials, such as electricity, heat, food, and sanitation. Some places have fared better than others. Natural disasters, massive food shortages, and pandemics have ravaged many regions and led to nearly two-thirds of the global human population dying off. As the powerful continue to hoard resources and use their wealth to achieve whatever physical security is possible, the environment and global political and economic systems continue to degrade. We are living on borrowed time.

Yaoyorozu Redux

In 2045, the natural and virtual worlds are fully integrated, but the Internet is less noticeable due to improved material flexibility, reduced sound, and aesthetics focused on minimizing conscious impact. After ratification of the Calcutta Protocol in 2027, use of fossil fuels was severely restricted, and computing quickly took on new energy-efficient forms—organic actuators, such as stimuli-responsive gels and polymers, biological computing, and other novel forms not using conventional metal or ceramic components, became prevalent. Geoengineering initiatives to slow global warming showed early signs of success, strengthening the drive towards developing truly "green" cities that effectively reduced human impact on Earth. Sophisticated machine intelligence was embedded throughout the built environment, and smart homes and cities were able to capture energy consumption in real-time and adjust based on critical needs rule sets and past usage patterns. Existing power grids incorporated clean energy sources, such as solar and wind power. These responsive systems provided personalized feedback, advocating for specific behavioral changes; and this led to energy conservation and reduced waste. Artificial intelligences (AIs) ensured that only data that was necessary for efficient operation of these systems was collected, and individuals were able to adjust their level of desired privacy in many cases.

Reliance on AIs to monitor the environment and adjust accordingly grew, and tools such as auto-responsive flood control and pollution filtering were deemed essential to human survival. These efforts led to a corresponding decrease in military funding and divestiture from fossil fuel funds, as public pressure to invest in green systems grew upon initial success. By 2035, smart things enabled with AI were all around us, embedded in nature. Like the Shinto concept of *Yaoyorozu no Kami-gami* ("Eight Million Gods"), referring to the infinite spirits or "intelligences" present in nature, the intelligent Internet provides useful services, protecting us, helping us, and making our lives more comfortable. With a renewed emphasis on the sacredness of natural processes and artifacts, we have channeled a widespread longing to restore the natural environment and come back into alignment with nature via Internet-enabled AIs. Many believe that we could not live without them. Certainly, we could not manage the complex systems that govern our environment without their guidance.

As the first artificially intelligent entities were recognized as conscious beings, and granted legal rights, a social divide began to occur between supporters of civil

rights for AIs and those who bitterly opposed them. By this point, we were so reliant on them to operate our smart environments that we gladly granted AIs oversight over many vital processes. Due to the reliance and trust most humans afforded them, AIs meeting a certain threshold were granted legal personhood. Enhanced civic participation and deliberation enabled by the sentient Internet led to more inclusive decision-making. To ensure the integrity of this system, a panel of trusted AIs was selected in 2043 as an ethics oversight committee to monitor and root out unjust algorithms and ensure transparency of government. Of course, this has threatened many people, particularly those whose power has been waning or those who oppose AI due to religious beliefs. There have been several attacks on the sentient Internet, but these have had little observable impact. While initially a small resistance, the revelation this year that AIs have added fertility inhibitors to the water supplies of overpopulated cities has led many more to speak out against them.

Conclusion

This chapter discussed several technical changes related to the Internet—the social semantic web and linked data, the instrumentation of natural and social processes, big data and graphing analytics, and cloud-based facial recognition—and described several threats resulting from these developments. The erosion of privacy, unjust algorithmic discrimination, and loss of anonymity were highlighted and linked to undemocratic shifts in power. Finally, three alternative scenarios for the future Internet were outlined as a means to explore key uncertainties about the future. As a result of the scale, complexity, and relative lack of visibility of network developments, we tend to think of them something that may occur in the future; however, technological infrastructures are in constant flux, and many of these "future" developments are already here in some form. Further, as Dourish and Bell (2011) observe, "thinking of infrastructure as stable, uniform, seamless, and universally available is clearly problematic" (pp. 28–29). Because the framework for the future Internet is already developed and numerous aspects of it are already appearing around us, it is essential that we critically examine these systems and associated narratives in order to stimulate meaningful discussion and design policies and systems that respect citizen concerns. By examining and testing alternative visions of the future Internet, we can more closely align the development of the future Internet with ethical, human-centered insight.

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Chapter 9
Metadata Analytics, Law, and the Future of the Internet

Ana Bossler

Introduction

The present economic structure places great value on information. The development of the Internet can reduce information asymmetry, as it emulates market networks. With the emergence of this new political-economic space, traditional actors move towards information and communication technologies (ICTs) and have become increasingly interested in gathering and analyzing data. The handling of information by governments and corporations has become a sensitive legal issue, because people feel increasingly uncomfortable with the capacity of data analytics to reveal personal information predicting behaviors. These violations of privacy are creating precedents for serious abuses. Governments justify their conduct by arguing that there is a trade-off between privacy and security, and corporations justify their increasing capacity to store personal and sensitive data by claiming that they can provide users with better, and free, services. Data privacy and access to information are clearly strategic in contemporary times, leading to a conflict between the limits of state action, corporate duties to shareholders, and individual freedom. This collision provides space for regulation constituting new rights and duties for all actors, to calm the tension between regulation and a free Internet space—a new Magna Carta for the Internet age. This chapter introduces the concept of the fluid society (Bauman 2006) and reflects on the changing nature of government–corporation interactions via the Internet. The rise of metadata and related privacy implications are discussed. Then, legal and regulatory responses are outlined. Finally, three scenarios related to future of the Internet are presented.

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The Rise of Metadata Analytics

In the 1970s, the world's economic structure began to transmute, emphasizing the multiplication of transactions as a key process.[1] Relations began to focus on short run contracts, and a fluid society (Bauman 2006), where the *Internet emulates market networks,* emerged in the form of decentralized networks. In these myriad contracts, the access and analysis of data became strategic, because it reduced transaction costs (Hui and Png 2006), providing a competitive advantage to firms. In parallel, the development of the Internet enabled the gathering and analysis of information to become easier, catalyzing the transformation towards the Information Society.

As corporations, civil society, and governments are increasingly interconnected through the fluidity of dynamic relations that are transforming transactions, the reduction of information asymmetry (i.e., where one party possesses more or better information than the other) is a central aspect of the information economy. Aiming to access and control information, corporations and governments have pushed the boundaries of privacy, gathering more data about citizens.

As information becomes more valuable, it becomes an object of exchange, resulting in both trade operations that share data provided to a corporation with third parties and related privacy abuses. *Metadata*—data about data—has emerged, and anyone with the available resources nowadays can analyze these data to know everything about us, even predicting our future actions to some degree using sophisticated analytics.

When we interact through the Internet, the content of our communication is not the only information that we exchange. We also send data about our own communication processes that allow our messages to reach their destinations—i.e., metadata. This information includes the location where a connection was made, when it was made, and to whom it was made, among other things. Through metadata, we leave a register of our personal profiles, and our behavior on and off of the Internet. We are always sending metadata: Even when we are sleeping, our smartphones track our location and update the system continuously.

Data mining is the business model of virtually all technology corporations, and more traditional business are quickly following suit. Target, an online retailer, says that data analytics enable it to know when a teenager is pregnant (and thus target her for an advertising campaign) before her parents know (Hill 2012), and the physical retailer Zara never runs out of stock, thanks to an intelligent system of on-time information about consumer shopping habits. These examples show how important metadata access is as a competitive advantage for corporations. When you know the shopping patterns of your clients, you can anticipate their demand, figure out the price they are willing to pay, and provide them with relevant advertising. Metadata can also create a profile of other traits: what we do, what we eat, our medical records,

[1] This transformation was furthered by the development of Eurodollars, the loosening of banking regulations, the abandonment of Bretton Woods, and the development of *kanban*—lean manufacturing—which enables an emphasis on short runs, due to the increase in number of transactions in terms of pricing.

and political views. When it is cross-searched with larger databases, corporations can essentially predict our behavior and anticipate our choices.

Governments are also interested in our metadata, because we are living according to the logic of a permanent Emergency State, where surveillance is justified as a means to promote security. The USA experienced the Cold War for nearly half of the twentieth century, faced the War on Drugs in the 1990s, and then was hit by a terrorist attack in 2001. The War on Terror became a real menace with global proportions. Terrorist actions were considered a result of the inherent freedom of the liberal democracies of the West, which include privacy as one of their fundamental values. After this attack, we were convinced that there should be a trade-off between security and privacy and, in this Emergency State, security was presented as the rational choice (Ipsos MORI 2014a).

Governments, through their intelligence agencies, have become obsessed with gathering data about us. The US government, through the National Security Agency (NSA), for example, has access to all mobile operators in the USA, mapping calls within and outside the country. In the UK and Australia, governments search for metadata generated by mobile companies, and in South Korea, there were 30 million government requests for access to metadata gathered by corporations. Some of these procedures are extrajudicial, using administrative procedures (Privacy International 2014).

In these ways, our freedom is reduced; both by corporations that direct us only to the information meeting our profile and by governments that know everything about us and can put us on a list of "terrorist" or "criminal" profiles based on arbitrary processes. It means that if you, without knowing, have a relationship with someone that is being targeted, you are an automatic suspect. In 2014, a former Central Intelligence Agency (CIA) director declared that the CIA had killed people based on metadata, demonstrating the danger of these data-gathering practices (Ferran, 2014).

Metadata and Privacy: Vulnerability and Demand for Regulation

The world has become increasingly virtual, powered by technology that requires us to supply our personal information in order to participate. The Internet has become attractive to the public because we can access information and communicate rapidly in most parts of the world. At the same time, the more content we access, the more information we need to provide. Direct costs are often limited (e.g., a device and Internet access), and developing nations are quickly gaining access to the Internet due to the dropping prices of mobile phones. Corporations, looking to make profitable their business models, have increasingly gathered, sold, or otherwise capitalized on personal data (e.g., targeted advertisements).

Google set the model for profit via the trade of personal data and, by the end of the 1990s, it acquired popular services like YouTube, Pinterest, and Blogger and

grew its own social network, Google Plus. Google collects personal information regarding the services you are using, how you are using them, and information that third parties store in your hardware to facilitate their services. Rival technology giant Facebook also capitalizes on user data. In 2014, its users alone shared an average of 10 billion items per day, and the company's acquisition of WhatsApp, the largest global messaging application with over 600 million active users (Olson 2014), has only magnified its power. If we include the metadata that Facebook collects, the potential value of this information is immense (Sterner 2014).

While the amount and scope of metadata continue to rise, people worldwide have become increasingly aware of the corresponding invasion of their privacy. We have realized that corporations increasingly offer products using information about us and governments observe our conduct. In 2013, a class action suit concerning the aggregate use of data through metadata was filed against Google in California after Google consolidated its different platforms in Google Plus. Though Internet users knew they were ceding data to each platform separately, the consolidation of the data in a single platform made the plaintiffs feel uncomfortable due to a perceived invasion of privacy as the interconnection of data could provide more information than each alone.

When you turn on your mobile phone, click on your WhatsApp icon, and call a friend, the WhatsApp servers (i.e., Facebook) know where you are calling from, who you are calling, what e-mail messages you read in between your communication, and if you ordered coffee on the way to work. Global surveys concerning the perceptions of users about data privacy, such as those conducted by Ipsos MORI (2014a, b), show that most people are annoyed when they learn that information about their attributes and behaviors is supplied to third parties. Nevertheless, when we voluntarily share this information with others, the legal understanding is that the information has stopped being private. This is because the Internet is considered an open space and, in its natural network configuration, information bits cannot be truly controlled. We are aware that we provide data such as our name, interests, and birthdate to corporations when we use a service, but metadata is the blurred part of this agreement. It is not expressly stated by the terms of service. As described above, metadata can reveal far more than the content of our posts on social networking sites. When we put metadata into the hands of the government or large corporations, it creates a situation with invasive tracking. The information gathered could be used to predict many aspects of our future behavior, including voting, and it has a clear capacity to undermine democracy. Due to old-fashioned judicial interpretation, metadata are considered less sensitive information in the eyes of the law. They have less legal protection than the content of our communications and, in most cases, these data are already available for governments and companies to analyze.

Most countries today have open legislation, which works as a loophole in terms of allowing interception of people's Internet traffic, even when one is not a citizen of that state. This would have been unthinkable only a decade ago. Furthermore, state security services share data with each other and, even if you are not considered a party of interest to your home country, you may have problems with a foreign one. In addition, governments not only intercept any information we provide directly, but forcibly extract data about us from third parties such as Google and Facebook

(Ipsos MORI 2014a, b). "The primary business model of the Internet is built on mass surveillance, and our government's intelligence-gathering agencies have become addicted to that data" (Schneier 2013a, para. 3).

As the world becomes more interconnected due to the fluidity of decentralized networks, the incentives for a Chinese company to mine the personal data of its Icelandic users is essentially the same as the incentives for a South African company to mine the data of its local users. Similarly, the incentives of the Indian Intelligence Bureau (IB) are the same as the US National Security Agency's (NSA) when it gathers data about people's activities worldwide. There is a growing idea among Internet users that the trend regarding regulation of personal data collection should be universal, with a supranational entity established to control and govern the limits of data gathering. This is because different rules about metadata in different jurisdiction can lead to a conflict concerning the legal treatment of our information and the limits of our privacy.

Personal Data and Legal Protection: The Internet as a New Political-Economic Space

Personal data is already the object of various protections through legal systems worldwide, as it can potentially, or concretely, cause damage to people or companies. Civil liability is a basic principle of judicial systems. Liability exists when there is damage to be evaluated. New cases related to metadata that are affecting billions of people fall into a blurred category, allowing corporations and governments the freedom to analyze information gathered through the Internet. The development of big data has led to widespread concern about the collection and gathering of personal information in contexts as diverse as employment, marketing, and government. For example, Google search results may provide negative information about an individual due to its search relevance algorithm; public databases can inform an employer if you have sued a former company (as occurs in the Brazilian judicial system); or a personal video may be released on YouTube that shares an individual's intimate moments with those not intended to see them.

In 1974, before the Internet's widespread diffusion, the US Congress responded to these concerns by passing the *Privacy Act*. The Organization for Economic Co-operation and Development (OECD) followed in 1980, publishing guidelines on privacy protection and transborder data flow. In 1995, the European Union (EU) adopted Directive 1 95/46/EC on data protection, concerning the prohibition of information transfer to jurisdictions that do not afford adequate protection (Hui and Png 2006).

In 2006, establishing a guideline for the interpretation regarding personal data, the Court of Justice of the European Community invalidated the *European Data Protection Directive of 1995*, based on the argument that massive metadata generation interferes with citizens' right to privacy. They found that access to metadata could not be justified under the vague reference to the risk of serious crimes or

terrorism: For the government to access metadata, it must have the agreement of a tribunal or an independent administrative organization.

In 2012, aiming to regulate the issue, the European Commission developed a draft of the European Data Protection Regulation, limiting state intervention in European citizens' private life. In Brazil that same year, the Internet Act was passed as a response to public outrage about violations of privacy suffered by an actress who had her intimate moments exposed on the Web by a hacker (Brazil 2012). The Supreme Court of the Philippines rejected a section of an act that allowed the government to intercept the origin of a communication and its destination (Philippines Court of Justice 2012). Here, the Court decided that metadata supply different types of information than content; hence, gathering metadata was considered a violation of privacy.

Concerning privacy and regulatory law, the European Tribunal of Human Rights has steadily decided in favor of privacy, and has considered the "right to be forgotten"[2] a fundamental human right (European Court of Human Rights 2014). The right to be forgotten first appeared in Argentina in 2006, when celebrities sought to delete scandalous information about them from the Google and Yahoo search engines. Virginia da Cunha filed a complaint against both corporations for returning her images and name when people searched for pornographic sites. In 2010, there was the case of a Spanish citizen who filed suit against a Spanish newspaper, Google Spain, and Google Inc. The complaint noted that Google still indexed legal notices from 1998 that "detailed his debts and forced sale of his property" (Streitfeld 2014, para. 29). The plaintiff alleged that Google's search engine violated his privacy because the issue had been fully resolved and those references concerning him were now totally irrelevant and harmed his reputation. The person requested that the newspaper remove the content about him and that Google Inc. and Google Spain remove it from their indexes. German, Dutch, and French courts[3] have also favored privacy and personal data protection, deciding against the collection and storage of data by private corporations such as Facebook. In 2014, the Court of Justice of the European Union, in its role as constitutional court, repealed all the content of the Data Retention Directive that obliged member states to collect and monitor metadata about their citizens through the Internet and telephone operators, in response to the 2004 terrorist attack in Madrid and the 2005 terrorist attack in London. The Slovak Constitutional Court set precedent as the first national court to align with the Court of Justice of the European Union, suspending the collection and storage of data through providers located in its territory (Husovec 2014).

[2] The right to be forgotten differs from the right to privacy because the first concerns information that is publicly known at a certain time, impeding the access of third parties, and the second concerns information that was not publicly known, and where there is a duty not to disclose the information.

[3] In 2008, the Hamburg Court of Justice favored the rights of former convict René Werlé, who had been imprisoned for murder. He had filed suit against Wikimedia, a company based in the USA that that had included hypertext links between his name and information about the people he had murdered. Protected by the First Amendment, the company had the right to divulge this data on US soil. However, German law also protects the personal rights of René from unwanted publicity.

The US courts, in the interpretation and framing of data mining in commercial transactions, have leaned towards the tacit authorization by users for the use of their data by corporations. For example, when Google users sued because their data on different Google services was commingled in 2012, US Magistrate Judge Paul Grewal twice dismissed the lawsuit on grounds that plaintiffs failed to demonstrate resulting harms (Warmerdam 2014) before allowing it to proceed. Google serves billions of online users around the world. With little revenue from its users, Google still manages to turn a healthy profit by selling personal information to advertisers. In this model, *users are the real product* (Schneier 2013b). This Google lawsuit is important because it involves metadata and the issue of privacy related to a private company's use of personal data. The plaintiffs sued Google on the basis of the unification of its services across the Internet via Google Plus. As the company profits by analyzing user information, it was logical to integrate data across services. Although the users knew they were providing data while accessing Google services, it was the integration of data that disturbed them.

In the USA, as in most judicial systems worldwide, there are two types of laws concerning privacy: constitutional law, which places limitations on government, and regulatory law, which constrains corporations. Historically, these two areas have largely remained separate, but today each group has learned how to use the other's laws to bypass their own restrictions (Schneier 2013a). There is a growing demand for new rules to balance this environment. Legal decisions and opinion surveys from different countries indicate that different groups have different levels of concern about data access. People in developed countries are more prone to value privacy than personalization of services, whereas in countries such as Brazil, China, or India, people tend to favor service access over privacy protection (Ipsos MORI 2014a, b). Also, even in more developed countries, state security agency surveillance of personal data does not concern people as much as big data analytics, which connect zöe (private life) and bios (public life) (Agambem 1995). Western legal tradition since ancient Greek civilization has separated these two spheres, which have now become blurred. While it is true that we already have a set of legal regulations worldwide that can be applied regarding the civil liability of big corporations and constitutional rules that protect fundamental rights against the action of the state, the Internet, as a political-economic space, establishes a new frontier where the relationship between constitutional law (e.g., the political dimension) and regulation (e.g., the economic dimension) has the potential to produce a new legal framework that takes into account developments such as metadata.

The Emerging Virtual World: From Bitcoin to the Internet of Things

The rise of the Information Society has altered the production framework towards a conceptual economy. The irrational exuberance characterizing contemporary times has led to a rupture between "real" and "conceptual" (monetary) economies,

represented by the dot-com bubble of 2000 and the financial crisis of 2008 (where investors expected the value of their assets would continue to grow indefinitely, as money continued to flow). This was based on the belief that, since the abandonment of the gold standard in 1971, money has become oriented towards credit and aims to expand the GDP. For this reason, financial derivatives, such as the subprime, enabled the financial system to create credit, providing higher financial liquidity, and eventually leading to global financial crisis. The growing gap between the "real economy" and the "monetary economy" made possible the creation of monetary value without corresponding real production. This established the potential to virtual economies and cryptocurrencies. There are two categories of cryptocurrencies: ones used exclusively in virtual economies, such as Facebook credits or World of Warcraft gold, and those used in the real economy, such as cryptocoins (Kostakis and Giotitsas 2014).

Cryptocoins use cryptography to make transactions semi-anonymous and decentralized, assuring their reliability (Luther 2013). Existing cryptocoins are inspired by the Bitcoin protocol, the first digital currency. They are designed to be predictable in value, producing no inflation, and maintaining their value. The pioneer digital currency was first introduced in a paper by pseudonymous author Satoshi Nakamoto (2008). In 2009, Bitcoin v0.1 was released. It functions as open source software that supports circulation of this alternative currency via peer-to-peer (P2P) networks. Decentralization is possible because the currency is distributed through nodes which participate in the P2P network instead of being controlled by a central bank. Its open architecture allows it to be constantly monitored by Netizens, as bitcoin transactions are recorded and made public in a ledger that prevents a particular bitcoin from being spent more than once. Computers in the P2P network are called "miners" and work to certify transactions in the ledger. To get bitcoins, one can either participate in mining process or exchange "real" currencies through the Internet. In 2013, more than 10,000 companies accepted bitcoins as payment (Kostakis and Giotitsas 2014).

Another technological innovation, the Internet of Things (also known as the Internet of Everything) is a network infrastructure that connects sensor-equipped physical objects to the Internet. It aims to extract higher value from information through the consistent exchange of data between the physical and virtual worlds. It is estimated that by 2020, 50 billion objects will be connected through the Internet of Things, and it will become more intelligent, predicting consumption behavior, for example. The amount of data gathered by the Internet of Things will enable a quantum leap in the Information Society, as every interaction between humans and the environment will be able to be transformed into machine-readable data.

The quantum computer is a long-known theoretical computational system that can enable the instant transmission of infinite data due to the properties of quantum particles. The difference between quantum computers and classical binary ones is that the latter always exists in a defined state (i.e., a binary system, either 0 or 1), while in the quantum world, the computer can exist in both states. This advance allows the performance of many parallel operations, overcoming a physical limitation of current binary computers and handling complex calculations exponentially

faster. The path to reach operational quantum computers is still long, but in 2015, IBM announced that it had made strides towards error detection and correction, a current performance problem of quantum computing (Byrne 2015). Researchers are confident that other barriers to a functioning quantum computer will be overcome in the next few years, leading to dramatic increases in processing power, and enabling advances in many fields, such as artificial intelligence and cryptography.

Alternative Scenarios for the Future Internet

In the preceding sections, we have discussed how both governments and corporations are increasingly interested in metadata; citizens are facing a resulting invasion of their privacy; and a new legal framework of constitutional law and regulatory law on the Internet may be needed to balance the interests of governments, corporations, and citizens. In the last section of this chapter, we provide three alternative scenarios depicting how these factors might develop differently in the future.

From Gold to Dollar to Data

In 2050, the maturity of the Internet of Things and the full adoption of electronic currencies have given rise to the "data standard currency," where everything is virtualized and economic transactions are dematerialized. This marks a new era of capitalism, anchored in "instantaneous information," as everything we do and think is transformed into electronic signals, bits of information. Electronic money is issued both by governments (and by private companies, who guarantee the issued value through data mining. This shift was catalyzed by the increasing inflationary policies of national governments that were aiming to repay debts, and it led to massive devaluations worldwide in the 2030s, leaving billions of people holding money with no value. Paper money was seen as extreme risky and, to peg the economy to something predictable, governments and firms shifted to electronic currency by 2040.

In parallel to the abandonment of paper money, the Internet of Things created and transmitted information about all human interactions, making data the most valuable resource in economic and social life. This led to the complete monitoring of all transactions, mapping our behaviors, and enabling a robust data market through the growing *datacoin economy*. The data market has continuously expanded since 2025, due to quantum computing and the Internet of Things becoming mainstream technologies. In addition to providing free services to customers, some corporations have found that they can access more valuable data if they pay users for it, producing a qualitative change in the system. Corporations and governments now pay for strategic data, and it is possible to buy and sell pieces of information, making data equivalent to a virtual currency. There is a menu of options, allowing people to

know how much their data is worth and sell it according to their preference. This increase in the number of options for managing and trading personal information is a notable contributor to the world GDP in 2050. As everything is data, and data is valuable, relations become contractual in all aspects of life.

In this context, people's privacy is protected by property rights, as personal data generates revenue for people. The old legal framework in use during the first decade of the 21st century, where people were the product of the Internet business model prevalent in the USA, was overruled: Now, everyone has become a rational economic agent, deciding what to share, with whom, and how much to reveal. These menu options are widely accepted by judicial systems worldwide, and are thus inserted into the production logic of the economic system. The relationship between individuals, corporations, and governments becomes contractual; thus, an equilibrium of obligations is set. Judicial courts, starting with local tribunals in the USA, begin to decide in favor of the obligation to reciprocate (basing their decisions on US contract law). It is understood which companies are abusing their position by receiving more than they are giving. The European Court of Justice's "right to be forgotten" also play a crucial role in shifting away from the old model of corporations and governments having access to all our data while we are unaware of what we are sharing, and how valuable our information is.

In the countries where individual rights predominate over collective rights, the interpretation of data as a property right and transactions as contractual obligations (in the context of commercial law) empowers citizens to make use of their data freely, according to the costs and benefits they will receive. For that reason, the USA has regained its position as a superpower of the free world in 2050, assuming this role due to its capacity to adapt to the new capitalist era of the datacoin economy. China was left behind due to its inability to adapt to the pace of this new world order.

In the still-developing world, governments, with the excuse of better resource allocation to fight poverty, make use of electronic money mandatory. The rise of China, which has been the USA's economic rival for decades, led to legitimization of the state control model in those countries. Chinese outward foreign investment has been imposing conditions on the developing world concerning data gathering. Governments in the developing world access and control citizen data, exercising power and limiting individual rights. Thus, in countries where state intervention has been historically higher (e.g., Brazil, India, China, Russia and South Africa), the use of personal data by third parties (i.e., without compensation to the individual) is tolerated.

Gradually, a new world division emerges: Countries where people tolerate government intervention into their lives do not profit from the information market because of data controls, and courts do not protect it, as they understand that data management by the government is in the public interest. In other countries, protection favors the free market. Humanity is divided between those who have access to data, and can thus make rational choices, and those who do not.

Brave Old World

Alexis de Tocqueville (1992) once noted that society is based on the inherent tension between state intervention and individual freedoms. By 2030, with the rise of developing countries and the multipolar order, the fight for power led to networks that were so pervasive that *all governments* felt they were menaced and established protocols to analyze all available data. Everyone was an enemy. The Internet of Things made us share everything we did, thought, or willed online. To fight the "invisible enemy" that was as fluid as our interactions, governments used our data freely and made associations based on our past behaviors. Only 10 years earlier,

China had suffered a series of devastating terrorist attacks, and international security concern led to ratification of a global treaty that allowed states to invade our private lives.

The Internet of Things enabled governments to predict everything we did, and no free action was possible: You could be judged for a crime before having committed it. As the power of intelligence agencies increased, their information gathering became more discretionary. As more abuses started to happen, limiting our private lives and sometimes arbitrarily leading to imprisonment, people started to understand that the trade-off between privacy and security did not exist: privacy *meant* security, as protecting shared data protected citizens from the discretionary power of the state. This became particularly obvious when governments began to read citizens' minds through chips implanted in the brain. At first, due to the prevailing Emergency State logic, people allowed the state to have increasing power over them. Data analytics led to systems that controlled people's lives, and they essentially *became* the information available about them. While this was initially essential to "keep us safe" as the enemies of the international order grew, this led to a surveillance state, and rebels started to hack people's information and attribute these attacks to third parties, leading to chaos.

State governments in Germany, the Netherlands, and the UK, with counterculture groups among their nationals, invaded the privacy of their citizens due to fear of rebel activity fomented by the North Atlantic-Pacific Treaty, a former treaty pushed by China in 2030. These actions harmed the civil liberties of citizens in general. To reverse this trend and return to the fundamental values of the Western world, in 2050, courts started to favor limitations of state power by blocking unjustified access to personal data, and they broadened the definition of metadata. The trend towards restricting state power started in the European Court of Human Rights. As people wanted to support global institutions in terms of civil and criminal justice, these developments fostered broader cooperation and international convergence in regard to privacy protections. Today, people do not tolerate any intrusion in their lives. Despite the fact that metadata has never been a clear concept in terms of service agreements, it is understood that those agreements were based on older principles from the European Union, where it was expected that people in a relationship would mutually respect privacy. Thus, the concept of privacy has been redefined to signify a fundamental freedom.

Concerning economic incentives, information is still strategic, but corporations and governments have to rely on users voluntarily allowing them to access and store personal data. To consolidate this position, the "International Principles of Humanity regarding Surveillance of Communications" was created as a universal framework to define metadata, data, and privacy. It was decided that no information capable of revealing sensitive data about a human being might be collected or stored without a judicial order, and that no information about a person could be traded without their consent. After a long and tortuous road lasting three decades, in 2050, the legal framework has moved back to the principles of the Magna Carta, which have already defended individual rights for nearly a millennium.

The Quantum Society

In 2050, quantum computing determines all of human life, as everything is now machine-readable information. In stochastic processes, data cannot be controlled, and bits can be in several places at the same time. Processing speed has increased exponentially, data transmission is instantaneous, and the amount of information is infinite. The quantum world has made us accustomed to the availability of complete information about an object of interest, everywhere, and by anyone. All aspects of natural and social life can be understood and predicted.

For the past 30 years, the Internet has become the space where life takes place and, as we work and establish social relationships, private and public life have blurred. In essence, we live in virtual space and have become used to the merging of our public and private lives. The more blurred this boundary has become, the more comfortable we feel about providing sensitive and personal data to governments and corporations in order to access better and cheaper services.

By 2020, as governments and corporations became increasingly addicted to citizens' data as a means to facilitate their missions, the race to gather and control it was initiated. As information continued to reduce transaction costs, it enabled market prediction concerning supply and demand, and this became the main competitive advantage of corporations. Companies that did not sell any goods or services but facilitated the exchange of information (i.e., intangibles) became the largest corporations. Those who had information dominated the world, and there were abuses by corporations that had more access to information. Governments also controlled citizens' lives and knew everything about them, including their political position. In economic life, corporations knew how much a person could pay for each product or service, and they targeted them with higher prices. Data gathering became a ferocious battle, as corporations and governments struggled to control our lives.

Citizens and smaller corporations soon understood that we could not win this battle, as bigger companies and governments had competitive advantages through their capacity to access data. As the complexity of the Internet increased and larger corporations owned more of our data, they began to raise market entry costs for newcomers, and thereby reduced the options available to consumers. By 2025, a

series of political revolts, economic boycotts, and hacktivist activity had quickly spread around the globe. Citizens began to see open data as the best option to balance relations, and there was increasing pressure on governments and corporations to make their activities transparent, coupled with cyberattacks by protesters seeking to "liberate" all data. While those in power initially resisted, after nearly three decades of worldwide rebellion, *all data* has become freely available. In 2050, access to information has become a fundamental right, rooted in ancient principles of constitutional law. Open data—not just about the government, but about citizens—is the rule. Increased transparency has made us aware of the capacity of technological intervention in our daily lives. We understand what we are sharing, how much it is worth, and who can access it. Everyone can access, analyze, and make decisions using all available data, and the interests of corporations that once controlled data are no longer favored. Network Neutrality, originally a peripheral North American legislation at the beginning of the twenty-first century, has essentially become the modern Magna Carta.

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Chapter 10
Information, Noise, and the Evolving Internet

Rolv Alex Bergo and Dan J. Wedemeyer

Introduction

In this century, global ICT (Information and Communication Technology) networks will significantly change—economically, socially, politically, technically, and environmentally. These changes will occur both in the structure and use of the Internet, and it will become more integrated with our lives. Humans will live in symbiosis with the Internet, and we will invent and use more dynamic tools to interact with each other and manage information. Intelligent tools will increasingly create, support, and control our personal and group behaviors. They will change cultures and alter our very existence. As network speeds increase and processor architectures and services advance several generations, the Internet will be integrated into our lives to the point that it will act as an extension or augmentation superior to our personal or group minds. This chapter draws on sociological theorist Anthony Giddens's (1990) concept of reflexivity, the circular relationship between cause and effect, in which there is a recursive production of structuring properties, to explore possible futures of the Internet. Institutional reflexivity deals with knowledge about how social life changes and reforms itself based on knowledge about how technologies influence us. Not only does technological development affect social development, but there is reflexivity in that development, as social changes lead to policy and further technological developments. Thus, they are mutually arising and mutually impacting phenomena. Giddens argues that one should not look at individual agency and social structure as

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opposing, discriminate forces. Instead, they should be analyzed as symbiotic forces. Actions depend on the agency of individuals, which is both enabled and constrained by the rules and resources that make such actions possible.

Our knowledge about how policymaking influences us leads us to change our behaviors, and our understanding of the enablers of the future Internet will allow us to discern alternative future pathways. This reflexivity is core to all futures research, and one of the most important factors to consider while planning for the future Internet. This chapter begins with a discussion of the present and near-term Internet before outlining some key changes that will lead humans into a more symbiotic relationship with it. We discuss some of the implications of this anticipated future, including increased dependence on the Internet and the growing tension between information and noise. We then discuss implications for policymaking. Finally, we present three different scenarios for the future Internet.

The Present Internet and Its Short-Term Future

In 2015, over 40 years after its inception, only about 40 % of the world's population has accessed the Internet. Between 2015 and 2020, the number of online users will double (GSMA 2014), and the Internet will reach almost four billion people. Many users will have multiple devices and, in total, over 50 billion devices will be connected in some fashion or another (Gartner 2014). In the short term, the devices themselves will be fairly discreet in their functions. Substantial traffic will be driven by one- and two-way video and streaming traffic and, as we move forward in time, more users will come online and have reasonable access to services. As we move towards 2020, there will be more utility- and device-specific traffic. There will be a gradual shift towards more machine-to-machine (M2M) interaction and, over the subsequent 15 years, it will increase to become a majority of the overall network traffic, assisting users by automating many tasks.

The next 5 years will be driven by more of the same in terms of bandwidth growth. It will grow, but gradually. The growth will happen in terms of the power and capabilities of devices, as well as bandwidth, to yield significantly more sophisticated technologies. By 2020, the fifth generation of mobile standards (5G) will be implemented. Many people will be carrying mobile devices that have a multi-Gigabit connection and the ability to connect to hundreds of thousands of other devices concurrently (International Telecommunication Union 2015). This development will lead to a leap in demand for bandwidth. By 2020, the Internet of Things (IoT) market will be almost $9 trillion (Dignan 2013). The IoT describes the "pervasive presence" of networked objects, or "things, that can communicate over short-range wireless networks" (Atzori et al. 2010, p. 2787). By 2030, the sixth mobile generation (6G) will be implemented and, if it follows the trajectory of the previous generations, it should have bandwidth potential in the hundreds of Gigabits range. New technologies such as autonomous drones as network service providers,

free-space optical communication, large-scale mesh networks (Knibbs 2014), and other high-speed solutions will also be employed.

As 5G mobile devices begin to be adopted, our capacity and use will increase dramatically. At the "tipping point," the market will need to evolve and adapt much more rapidly than before. At this point, the wearable technologies we have been enjoying will be connected in a much more symbiotic way. Instead of accessing the Internet using traditional means, more dynamic interfaces like speech, presence, gestures, and thought control will evolve and be seamlessly integrated into our daily lives. In addition, the tools we use will be smarter, demonstrating a significant ability to predict our needs. More intelligent tools with their own learned predictive behaviors will support our daily lives. This will provide us more productive and convenient, and safer lives.

Growing Dependence on the Internet

Throughout history, our societies have undergone increasingly rapid change—from hunter and gatherer societies that lasted many thousands of years, through the agricultural age which lasted a few thousand years, to the Industrial Revolution that has lasted only a few hundred, to the so-called information age that has lasted about 50 years, and now to the Internetwork age (i.e., when large numbers of people began to use the Internet) that, so far, has lasted for some 20 years. Each has been enabled by the development of new technological tools. Traditionally, our tools have facilitated varying degrees of change in society. The Internet has facilitated a radical change, altering how we fundamentally interact with each other and thus the architectures of many societies. The Internet is an indirect enabler, in that it facilitates the production and of new tools. It is a platform for innovation.

We see 2020 as the *jumping off point* for the scenarios presented later in this chapter. That is when technological developments such as 5G will facilitate a significant shift in how we use the Internet, and *humans may become absolutely dependent on it*. We already on the way to becoming integrated, networked beings. Our skills are so specialized that we are becoming completely dependent on these networked tools for survival. The Internet acts as an augmented memory, managing our transport systems and business logistics, and increasingly artificial intelligence (AI) and M2M are automating many aspects of our daily lives. The Internet is not as resilient or recoverable as we might wish; in fact, this reliance has led to a general fragility.

There are a number of ways the network could break down (e.g., cyberwarfare, traditional warfare, natural disasters, energy shortages), intermittently or for long periods of time. Due to the increased efficiency afforded by the Internet, and the structural changes that have accompanied them, we could not easily go back to previous ways of living. Our social and economic structures have become embedded in network logic. As DeBord (2013) observes, the Internet provides value via communications, information, and transactions, all supporting critical functions in

human society. Many forecasts for the future of the Internet do not focus on the deeper relational constructs that are changing via global networking—how we communicate and perform transactions with the aid of ICT. However, many social theorists have focused on how the Internet has altered beliefs, feelings, behaviors, and attitudes (e.g., Giddens 2002; Avolio et al. 2004; Song et al. 2004). Over the past 20 years, the Internet has become an integrated part of daily life. Yet this is only the beginning. In the next 20 years, the changes will increase in velocity and impact.

In addition to the dependence society, other risks involved in these developments are issues such as rapidly diminishing privacy, the threat of Orwellian surveillance societies, the possibility of social isolation for some individuals, and psychiatric issues such as addiction and retraction into fantasy worlds through virtual or augmented realities. For example, the boundaries between physical and virtual worlds may start to blur, further altering our perceptions of time and space. However, these more dystopian forecasts might not come to fruition. Despite media portrayal of technology as a deterministic force, it is important to understand that the Internet itself does not fundamentally change anything. It is only an *enabler* of change. It removes many of the logistical barriers we have had for communication, information access, and transactions. Change itself is caused by humans interacting with the network and, in many ways, the Internet also enables us to reach further toward some of our unlocked potential. To what extent we choose a wholesome path is, for the most part, up to us.

Information, Misinformation, and Disinformation

The Internet has amplified the tension between information and noise. Both misinformation and disinformation are considered forms of noise. Misinformation relates to false or erroneous information that is spread *unintentionally*, such as the many viral posts on social media sites that contain erroneous information. For example, Luckerson (2014) notes that a great deal of misinformation about the 2014 Ebola cases in the USA was spread via Twitter, making it seem as though the disease were running rampant through multiple cities:

> Trying to stem the spread of bad information online actually shares many similarities with containing a real-world virus. Infected Internet users, who may have picked up bogus info from an inaccurate media report, another person on social media or word-of-mouth, proceed to "infect" others with each false tweet or Facebook post. (para. 3)

When erroneous information is *deliberately* spread, it falls under the category of disinformation. These deceptive forms of communication are strategically designed to confuse or mislead others. In some cases, outright censorship of certain information is performed. Where this is not possible, incorrect information may be disseminated to drown out truths which the creator wants to conceal. Common examples of disinformation include campaigns by military or national security intelligence organizations or political lobbyist groups. Sir Tim Berners-Lee, the creator of the World Wide Web, notes that the Internet fosters disinforma-

tion (Swaine 2008). He cites examples of anti-science activists claiming that vaccines harm children, or that switching on CERN's Large Hadron Collider (LHC) would destroy the Earth. Despite scientists' denials that the LHC would create a "microscopic black hole [that could] potentially suck up the Earth" or that a "strangelet could convert our planet into a lump of dead 'strange matter'" (Moskowitz 2012, paras. 1, 4, 6) laypeople were still concerned. Disinformation and misinformation represent growing noise that thwarts the communication of accurate information necessary for decision making.

Implications for Policymaking

As noted above, technological developments and momentum for the next 5 years are, for the most part, established and well understood. The Internet after 2020 will be at an inflection point. The technologies we have been enjoying for the past two decades are undergoing significant and fundamental shifts that will enable us to live more symbiotically with the network. As with most technologies, the Internet goes through technological S-curves (or multiple, sequential S-curves) of development (Christensen 1992). Yet, the rules that allowed the Internet to be generative in the past are changing, becoming more restrictive as many countries work to censor or "secure" the Internet (Freedom House 2014). Network Neutrality—the idea that governments and ISPs should treat all data on the Internet equally—is also being threatened. This principle has been an axiom from the start and has acted as a scaffold for the Internet as we know it today, ensuring that one can access services or run a business without being bullied by a large network provider. As such, Network Neutrality has been one of the most important drivers of change for the Internet. It keeps the threads of the Internet ready for all the services that are developed with, and on, it.

Figure 10.1 illustrates the relationship between three groups that influence the development and progress of the Internet: users of services (this group also includes application providers), policymakers, and suppliers of services. In many ways these are also the major beneficiaries of the different paths Internet development may take.

The technological direction is influenced by policies, and policymakers put different weight on various aspects based on influence by stakeholders, such as suppliers of services, other policymakers, and to some extent, users. Suppliers of services are mainly influenced by policy makers and, to a lesser extent, end users. The Internet Service Providers (ISP) are working to avoid their products becoming commoditized and to control content on the service level. Network Neutrality principles seek to provide that control at the application level in the value chain.

Application providers, users, and interest groups are working to offer services and to provide those services at the application level of the value chain. Note that users of the ISPs can also be companies, organizations, and a variety of user groups. Policymakers attempt to balance the needs of service providers and users. This is a balance between common goods and facilitating an environment for technology development and innovation.

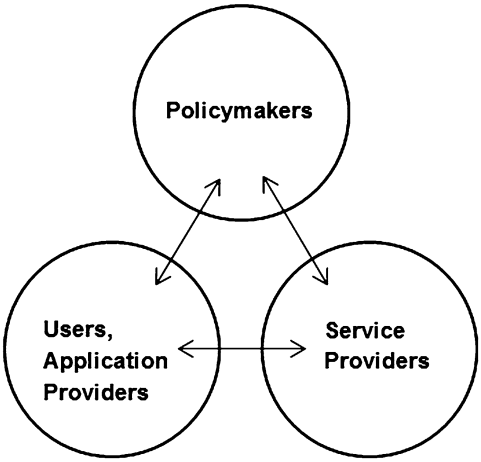

Fig. 10.1 Relationship between policymakers, service providers/carriers, and users/application providers

In general, network topologies that design single points of failure are weak, as points of failure without systemic support and recoverability will always lead to vulnerable systems. This fragility increases risk. Service providers are already looking at how to mitigate some of the traffic risks involved; however, some of the solutions they are considering will harm Network Neutrality. The tension is often between users who demand continued building of the networks and service providers who would prefer to offer a more granular level of connection. A one-size-fits-all solution is not ideal, as stakeholders domiciled in different cultural and economic contexts will have different demands and circumstances. These conflicts could be mitigated by more specialized solutions. It is important to note that, even if there is a general perception of the Internet being a single network, it consists of many (inter)networks. There has never been a single, utopian, global Internet. As Goldsmith and Wu (2008) note, because there is no single Internet, collaboration is necessary, and the Internet requires global-scale regulation. The Internet means very different things to people in different regions and organizational structures. As a collection of nation-state networks, decentralized governance is needed.

Failed policies, or a lack of guiding policy, can lead to the loss of meaningful technologies. Many governments perceive the facilitation and flow of information provided by new technologies as a threat to their power structure. Instead of changing with society, they try to limit the technology by controlling the content and delivery directly. The actions by some governments to limit citizen power could also cause people to rebel. Policy is influenced by forces of actors and human nature, and finding a balance while also being responsive enough to answer an increasingly rapid development cycle will continue to be a problem. Slow policymaking leads to other technologies and forces gaining momentum. The major changes in network infrastructure and Internet services are driven by policy. In many ways, policymakers must balance between keeping service providers invested and, at the same time,

facilitating economic growth in general. They must balance the highly complex needs and wants of many stakeholders. However, policymakers are not always well informed before making decisions and are unable to fully comprehend the technological intricacies and wide array of societal dependencies. As a result, Internet providers and users may start trusting private corporations more.

Building Alternative Scenarios for Policy Deliberation

Because policymaking typically lags behind technological developments, policymakers must rely on forecasting methods to explore possible futures and wire up the negotiating powers of society to accomplish meaningful change. Scenarios are a forecasting tool that allows deliberation about possible deep implications of what might occur if certain conditions are directed, realized, and developed. Scenarios are neither wholly positive nor negative. Instead, they are caricatures of possible futures that present different potentials intended to provoke discussion and *reflexively alter the future by stimulating appropriate action in the present*.

A scenario addresses developments that are surrounded by some degree of uncertainty. There is no attempt to make a complete model; instead, we identify a few critical developments that have significant impact on the world and can be compared across the scenarios. The scenarios presented later will take a closer look at the biggest drivers for change, (i.e., events) and how these drivers may impact various trends. Key events addressed in our three scenarios are: levels of innovation, productivity, legislation related to Network Neutrality, and bandwidth. Bandwidth, along with other policies, functions as a facilitator for changes in productivity and innovation. Some of the events that have the greatest impact on accompanying trends are the implementation of specific policies and technological innovations that cause discontinuous or disruptive developments. In essence, they provide something new uprooting industry conventions and significantly change markets. Of course, these exist in a reflexive symbiotic environment with the trends.

In addition to the events, the following assumptions are built into the three alternative scenarios that follow. To understand the scenarios, each should be taken into consideration.

1. Although policies are by nature oriented towards the future, and supposed to facilitate a more desirable outcome for the electorate, technological developments move so fast that policymakers, in general, are constantly playing a game of catch up. The policymaking process is long and tedious, involving years of deliberation. As long as that does not fundamentally change, *policies will continue to trail technological developments*. Considering the time it takes to create new acts, and how little agility is embedded into policies, the legal output is often flawed. In many cases, the policies seem to be more a tool that favors specific groups over others instead of being a framework that evens the playing field. This often leads to rifts between policymakers and the public, where policymakers are perceived to be out of touch with citizen needs. Although most policies are

made to respond to concerns, some have been overreaching. The end result is that very few policies are developed with future-oriented frameworks. The process is also complicated by tensions between information and noise, where noise (disinformation) can be created to facilitate a masking of information. For example, companies may create fake information to mask their true activities that might offend some people, or they may create dishonest campaigns to harm competitors. Policy decisions may be based on erroneous information. For example, during the recent debates on Network Neutrality that prompted the US Federal Communications Commission (FCC) to declare broadband a public utility, lobbyists for large ISPs sponsored a campaign that claimed Network Neutrality was actually a plot by the government to control the Internet. In one particularly odd case, American Commitment, a conservative political group, attempted to initiate a "grassroots" campaign to destroy Network Neutrality by claiming it was a Marxist attempt to destroy capitalism (Post 2014).

2. *Companies will continue to prioritize short-term profits over other potential objectives*. Milton Friedman's (1968) concept of greed continues to be a main driver for companies and individuals alike. That is, companies see their performance as a zero-sum game and will always attempt to outcompete other companies, as their primary goal is to serve stockholders by fighting for their own profitable positions. There are antagonistic forces between shareholders' short-term benefits and what is considered the public good. It is in a company's nature to destroy the same free market that enabled it to grow. As a result, companies seek to influence policymakers to do what is good for them. This is not necessarily a bad thing, because companies contribute to economic growth and innovation and, therefore, prosperity. In fact, large companies seem to have a bigger impact on innovation and growth than other stakeholders (Hoshi et al. 1991).
3. *Technological development will continue at an increasing rate*. A variety of new ways to connect will be developed. Fiber will not be the only way to connect at high speeds: satellites, drones, lasers and high-speed digital technologies that have yet to be development will also be employed. While wireless networks will become ubiquitous, a variety of new ways to access the networks will be developed. Like Castell's *space of flows*, these networks "reconceptualize new forms of spatial arrangements under the new technological paradigm" (Castells 1989, p. 24). Wireless mesh networks will become faster, and aid devices that are not directly connected simultaneously. The networks themselves will become more integrated, and devices will move seamlessly from one network to another. Most devices will also act as a message transporter to further enhance the mesh cloud, and therefore mesh networking will become efficient over larger areas, bridging additional devices and people. Political, social, cultural, technological, and economic changes will continue to be shaped by the spread of networked ICTs, just as the technologies will be shaped by these forces.
4. *Personal privacy will increasingly be under threat due the capitalization of information*. Some groups will continue to fight to protect privacy. Citizens have defended against privacy violations via *sousveillance*, identifying and recording surveillance systems or individuals who support them. In addition, privacy

enhancing technologies (PETs) have been created and disseminated by privacy advocates. PETs include technologies that allow users to, for example, generate a constant list of fake Internet searches to add noise to the data collected about them. Others are researching ways to send fake signals from medical devices such as insulin pumps or pacemakers, which can be readily identified based on their wireless signal patterns (and perhaps used to discriminate against people). Despite these efforts, the average citizen's privacy will eventually become non-existent.

5. There will be few traditional large-scale wars in the next 20–30 years, whereas multiple cyberwars wars will occur. In such war situations, multiple informational storage and transport sites will be disrupted or attempt to remove believability and real confidentially of all attempts to deal with information. In addition, sabotage to Internet infrastructure will severely inhibit development and innovation.

The aforementioned events and assumptions help shape the contours of our three futures scenarios: *The Oligarchic Network*, *Split Networks*, and *The True Network Society*. Each takes place in the year 2045 and looks back on the developments that lead to this future.

The Oligarchic Network

By 2020, as a result of reneging on its promise to share more of the top-level control of the Internet, the USA was able to retain control of the overall network. This was mostly due to concerns that countries that the US Congress did not trust would be able to influence the development of the Internet. In addition, backroom negotiations with security agencies convinced policymakers that keeping control would provide a higher level of safety for the country at an acceptab`le cost. Thus, the USA remained in control of the Internet Corporation for Assigned Names and Numbers (ICANN) after changing its mind to secede control over the Internet root-naming giant. Over time, it further used that power to remain in control of certain other developments. Today, the battle for the Internet is long over. The FCC never got the mandate they needed to keep the Internet open and free. Effective lobbyists influenced the process for Network Neutrality to the extent it became meaningless due to changing powers in Washington.

The FCC's bid to consider the Internet a utility or common carrier caused a lot of friction in the latter part of the 2010s. Subsequent bills were so watered down that they left the field wide open for service providers to do what they wanted in trying to create value. This lead to a much lower level of influence for the FCC on ISPs, and it provided them autonomy when negotiating vertical service integrations. Relaxed regulation led to a free-for-all on the service layer, with a few service providers emerging to control the flow of information.

The resulting networks advanced the collaboration between nations and business states, but today the trust between nations is at an historic low and will remain so until a shift based on negotiations from private corporations is achieved.

Some of the initiatives the service providers created to innovate on their own lines included separating certain protocols for higher-tiered pricing. This allowed them to better control the bandwidth and have more even usage, thus lowering the cost to run the lines. In addition, they could provide a variety of service packages. The result was that service providers started bundling services together. This, unfortunately, made it harder for consumers to understand exactly what they were paying for. In addition, the service providers charged content providers for giving them access to enough bandwidth to run their services properly. It also made it hard for new companies to grow at a fast pace, as they would be asked to pay for many different lines. This, in many ways, ended up being a more efficient use of bandwidth, but it also stifled the building of more capacity. This, in turn, lowered the overall economic growth and overall level of groundbreaking new markets and disruptive innovations. Whenever a groundbreaking innovation requiring a significant amount of bandwidth would come along, the demand from service providers would generally be so costly that it slowed growth. This made services much more expensive at the top level of the service pyramid. Gone were the days of free apps and services, and online communities were much smaller and more divided.

The overall result was that large multinational corporations ended up with a significant advantage in controlling every aspect of the content, speed, and protocols of the end user subscription services. The corporations invested heavily in developing new services on their lines. They had good control over who provided application and content services. The control of the lines moved from allowing everyone to provide application and content services equally, to a model where, at first, only large-bandwidth-demand suppliers were asked to purchase extra bandwidth. Finally, a "walled garden model" surfaced, where application providers had to go through an approval process, and where the individual service providers were approving or not approving applications on their lines.

The amount of control and utility the service providers had on their own lines led to even more market consolidation with fewer large service providers controlling the worldwide market. This was done through ownership of international joint ventures or creation of international non-compete agreements. The competition between service providers made them want to have exclusive rights to some types of applications. This made consumers choose some services over others based on what was available for lower cost in the networks. There were low levels of protection for smaller application providers, and many times applications that consumers had, at some point, been able to access were removed by the service providers because of disputes. Other times service providers would switch to other application providers simply because it made better business sense for them.

In some respects the per megabit cost of providing Internet service went down, but the end user saw very little of that impact because the few providers had no real incentive to compete on price. Because of innovation, some end users could get lower-level connections at no cost, as the service providers could inject targeted advertisements directly into other application providers' content.

To the end user and smaller companies, this is now experienced as an oligopoly. In some respects it has advantages in that users can travel and still be connected to

the Internet. They can get reasonable services for a reasonable, per-Gigabit cost. In many respects, they do not know what they cannot access except for a few very large application and content services. The service providers sign exclusive agreements with the advantage of gaining a competitive edge. These service packages are very confusing to most end users, and they tend to opt for the services they know. The high bandwidth and unrestricted use of application and content is prohibitively expensive and most homes have opted out of such services.

The worst impacts were to innovations from small companies. The pay-to-play option that service providers implemented for high-intensity application services, such as video streaming or augmented reality, benefitted incumbent technology companies. This severely handicapped other cash-intense activities in the technology innovation sector. The impact was a shift from an entrepreneurial ecosystem to one where technologists were collected in larger organizations. These had bargaining power in incumbent application service stacks. However, the large organizations were not as willing to test new application services. The speed with which innovation happened decreased significantly, adversely affecting the global economy.

Service providers attempted more vertical integrations and were able to compete with incumbent companies. Some larger transnational application providers had initial success and soon became so large that their power heavily influences both users and governments across continents. By 2030, it was clear that we were living in a corporate state, where geographical boundaries were no longer relevant, and we were instead citizens of specific networks, across space. People can be members of multiple corporate states. Citizens have no direct vote, but policies are determined directly by popular opinion.

Corporations benefit by spreading disinformation about competitors, confusing consumers about what services to choose and leading to less movement between service providers. This noise (disinformation) is amplified by journalists, interfering with factual information about different services that are provided. High amounts of noise also lead to the illusion of competition and a competitive marketplace for services: In reality, there are a very few providers dominating the market.

Application providers have paid the service providers for exclusivity or, in some cases, they were paid by the service providers for exclusivity. In terms of application providers, only a few very large suppliers could afford full coverage. Many times, the large providers have exclusivity, and it is next to impossible for growing companies generate enough cash flow to participate. This has led to a much more consolidated oligopoly of application providers. In many cases they collaborate with ISPs to allow their content to be heavily prioritized. The model could sustain many more users, as tired pricing has led to higher prices for great connections at high traffic times. The service providers have also facilitated lower pricing in off-peak hours for application providers that want to supply content for low cost. The level of disruptive innovation is low. Most innovations were related to product offering and controls.

Because of enhanced network intelligence, the service providers now control data streams at an unprecedented level. The cost of services in this network is higher for application providers, which skews innovation towards larger companies. In general, larger corporations contribute more to the economy,

but they have a detrimental effect on some of the other dimensions in GPI. The happiness level is generally high in this scenario, but other factors such as privacy and happiness are mediocre.

In general, this scenario favors large companies and has the following characteristics:

- A few suppliers and very powerful players lead to an increase of corporate power,
- High amounts of noise lead to the illusion of competition and a competitive marketplace for services,
- Fewer opportunities for smaller innovators and innovative applications,
- The Internet consists of a set of networks with strong owners working together with common protocols and standards
- Service providers/carriers control the services and get paid at both ends, leading to innovation on the lines,
- Innovation occurs primarily on the service level, but is generally not a type that benefits end users, and
- ISPs offer a large set of different services, but it is hard for most users to understand what they are paying for.

Split Networks

For years, US policymakers neglected the international community's pleadings for a more collaborative governance of the Internet. Instead, they chose to centralize the controls more than before on the advice of the National Security Agency. As it soon became apparent, it was too difficult for the US government to give up its power and influence over the direction and decision-making processes for the Internet. This led to a heated, international debate about the extent to which the USA had any intention of sharing management of the domain root authority. These actions contributed to increased global tensions and the resulting risk.

The Internet, as we defined it for its first 50 years, ceased to exist. Because of the USA's resistance to sharing governance and responsibility for developing new protocols for a global Internet, the network split into multiple, large units governed by collaborative partners. Instead of having traditional nation-state configurations, after 2025, the Internet emerged in the form of "splinternets." The center (in terms of the name servers) did not exist in the same manner as before. Europe separated their network from the North and South American networks. East and Southeast Asian countries, led by a strong China, comprised another network. These networks could be comprised of countries, or even corporations. In effect, it was the rise of the corporate state. As separate Internets were created, and the networks fragmented, different protocols were employed on different networks. The physical separation of networks did not mean that it was impossible to transport information between networks, but the automated algorithms monitoring network traffic had to approve any information crossing borders. In essence, information in and out of the networks was rated with different security levels, and each of the networks had their

own proprietary encryption strategies. In addition, some networks developed new protocols for transmitting data to further control what data was transmitted on their networks. As these restrictions and filters continued to grow, governments created more monitoring systems until the networks themselves required separate protocols and identifiers to transport any information. It ended up becoming a virtual arms race, with different governments and companies spying on each other.

In some networks, each host had to go through a formal approval process to be allowed to serve information to the network. This added a layer of bureaucracy to the network, slowing down overall innovation. As the decision-making process slowed down the majority of approvals, this built in weakness had an effect on these processes and enabled larger corporations to set accounts for an automated approval process. Having the right connections was an advantage when it came to have the application service approved in the network. As this system evolved, larger service providers started developing their own services across international boundaries. In the business-to-business (B2B) markets, information application providers had to maintain a presence in locations where they wanted to do business because companies did not want their data to cross borders.

State security agencies' increased power led many governments to start monitoring the traffic that was passing through the Internet more closely. Although initial promises were made that the information collected was safe and secure, frequent cases of abuse and misuse, in addition to documented leaks of private information, were happening. It became public knowledge that security agencies from a variety of governments had also forced the creation of security holes in applications by embedding them into open source applications. There was citizen concern, but it was never focused enough to impact surveillance processes. By 2020, this had led to the perception that the privacy and relative anonymity that people previously enjoyed were no longer possible on Internet. Increasingly, people began to alter their behaviors—avoiding searching for controversial topics, fearing speaking their mind about political matters, and so forth. Despite public backlash, state security agencies continuously argued for more surveillance and control, and the secrecy of these activities made it difficult for the courts to intervene.

State security agencies spread disinformation about the level of threat from other states and other Internets, in many cases overestimating to generate fear and enable agencies to further influence the conversation. Due to a lack of transparency, noise also occurs in the form of misinformation, as speculation leads to misinterpretation of data.

The intrusions into open source development also had a chilling effect on application development. When this problem was discovered, open source application community developments could no longer be trusted in the same way they had been in the past. This also greatly increased the resources and time it took to develop services. As a result, innovation decreased rapidly. This occurred after the enterprise markets for software as a service, platforms as a service, data as a service, and devices as a service had gained widespread acceptance. These changes had made enterprises more efficient. However, as software as a service (SaaS) products were identified as having flawed security measures, enterprises stopped using them. Large multinational corporations had to quickly reevaluate their security strategies and revert to less efficient processes.

As states argued about where to focus their powers, a new form of protectionism emerged. States began to block content that was not approved, essentially leading to political negotiations on the state level to determine which applications were allowed or disallowed. To enable these negotiations, a model based on the United Nations Security Council (an action-oriented group) was designed. It was called the Internet Union (IU). The Internet Union attempted to facilitate a more open exchange, and this led to a strong localized software development culture. The markets that application providers developed for were increasingly smaller and, as a result, had lower overall value. This did not only affect products in one specific area: Companies that once had the chance to access large, global markets now either had to focus on smaller segmented areas or create complex, locally responsive applications, with data separation and custom protocols.

Private and revolutionary product innovation is low and, even if these developments made the public safer, they did not perceive that they were. Instead, the overall community was more internalized within each Internet area. This led to an overall lower growth in trade between countries, and the complexity for cross-national trade increased. The corporate environment was inefficient, but users felt like they had a lot of control and tended to stay within one network, with little traffic flowing between networks.

In general, this scenario favors government security agencies and has the following characteristics:

- The USA retains control of the Internet, and several new cases of spying by state security agencies in the USA and other countries lead to a formal splitting of the Internet,
- Other countries protest and create boundaries limiting access to "their" side of the network,
- Governments add technical and regulatory control and use their power to monitor people, places, and things,
- Trust between nations is lowered, leading to enhanced risk,
- ISPs/corporations have less power than in other scenarios,
- Security is increased, but citizen happiness decreases, and
- Noise occurs as state security agencies spread disinformation is about the level of threat from other states and other Internets in order to generate fear.

The True Network Society

After the USA tried to renege on their promise to start sharing more control of the Internet root authority, massive national and international pressure from a wide variety of groups forced the USA to rethink their strategy. Internal pressure came from powerful public groups that had gained massive end user support. In addition, several of the larger application- and information-based corporations invested in campaigns dedicated to internationalizing governance of the root authority. Internationally, pressure to delegate the root authority to an international group was both diverse

and, in many instances, heavily politicized. Regardless of intention, and the multifaceted wrangling to gain power and momentum on the international stage, plans to create an international oversight and decision-making tribunal were made.

Initially, the IU had only representatives from individual countries, but as time went on, more corporate representatives and special interest groups were included to make sure everyone had a voice. International disputes were addressed via predefined agreements, and illegal activities were dealt with in a separate tribunal, where all members had agreed to honor and respect decisions made by the tribunal. Parameters were set for response time and the types of requests that could be made. Not every country joined the IU, but enough supported it to make a sustaining impact on Internet development. Countries that chose to stand outside the IU were still connected, but constraints were put on them if they did not shut down illegal activities. Some illegal activities continued, but because the tribunal was an international organization, they could respond to, and deal with, requests across international boundaries with relative expediency.

Due to a focus on transparency of governance, disinformation is rare. However, there is a great deal of noise generated through the processes of collecting and sharing information. This misinformation (i.e., erroneous information) is created and spread by private citizens and application providers. Innovative services that automate some of the fact-checking arise, and because information flow of across the Internet without restriction, it is easier to sift through, locate, and evaluate information.

In 2023, one of the critical statutes created by the IU dealt required all content to be treated equally as it traversed the Internet. This led to an unprecedented growth in bandwidth demand that further led to increased activity in building capacity in the network. As the price of bandwidth started to increase, the IU collaborated with interested organizations to create new protocols for communication that had less overhead. The major breakthrough difference from before was that content was now prioritized based on its classification, with prioritization based on actual need.

As the relative bandwidth price started increasing, new models for sharing Internet connections also started appearing. Devices in areas with low or no connection could either connect via drones, or the connection could hop from device to device until it reached a connection point. The development of new network protocols enabled devices to function seamlessly between mesh networks and more traditional networks. The definition of the Internet evolved to be more decentralized, and the overall architecture became more intelligent. Between 2020 and 2030, the number of networked devices doubled, and end users had control of tiered networks that communicated constantly with each other. This model allowed for a private network that could traverse a variety of paths, making general surveillance much harder.

New network and application innovations for end users led to more device-level security and private-network-level security; however, breaches were still commonplace and were assumed to be part of the process. These types of innovations empowered end users so much that it was easy to access large markets due to international collaboration. It was reasonably easy get access to application frameworks where new services could be built or extended. The level of innovation in small businesses was very high, and most workers had their own companies or were guns for hire for

a variety of larger companies. A variety of new hardware platforms were also designed and developed by larger corporations, which facilitated further innovation by end users. The overall trend was a loosely coupled society of small service and skill providers. There were still large cross-national corporations, but their overall power waned as network developments created an environment where value was created much closer to, and in symbiosis with, end users. Instead, a lot of smaller units would add value in ad hoc fashion and work relationships were more transient.

In this scenario, even though spying and hacking are commonplace, users feel safe. They educate themselves about how to find their way in the system and what services to add to their portfolio. Most of the time, this is taken care of by AI. For the most part, there are much better offerings, but people have a responsibility for keeping up with relevant developments.

In general, this scenario favors transparency and citizen empowerment and has the following characteristics:

- Increased international pressure to share governance,
- International collaboration, with high levels of transparency and trust between states,
- Disputes emerge under international rules,
- Strong emphasis on Network Neutrality,
- Due to a focus on transparency of governance, disinformation is rare. (However, there is a great deal of noise generated through the processes of collecting and sharing information).

Conclusion

This chapter examined technical changes related to the near-term Internet and described the emergence of a "dependence society" and the growing tension between information and noise. Three different scenarios for the future Internet were presented. The actual future will be much more multifaceted and complex than the simple models set out here, but we hope that these scenarios can help reduce some of the uncertainties. The intent has not been to make judgements or recommendations, but to demonstrate that different scenarios have advantages and disadvantages depending on a wide set of values. The value systems determine the fundamental guidelines for choosing how the future Internet may continually evolve. The forces described will make shaping and controlling this future ICT environment especially difficult and exceedingly interesting. Of course, there is no single set of futures or conclusions that can definitively be set out for the next 20+ years of the Internet. Some paths will be advanced by certain vested groups depending upon specific needs or rationales. In many cases, misinformation (noise) will be employed to influence policymakers.

The policies that are developed to guide the Internet's development will determine the general communication structures and services of the future, and these should not

neglect consideration of basic communication rights that support both personal liberties and the maintenance of a fair playing field for economic development. These fundamental rights should not be overlooked or excluded. They should be embedded in the network/networks evolution. No specific set of values or beliefs should be imposed; however, protected openness should be a steadfast commitment.

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Chapter 11
Liquid Democracy and the Futures of Governance

José Ramos

Introduction

The governance of our societies and our world is in transition. Far from an endpoint or "End of History," as Fukuyama presumptuously argued (Fukuyama 1989), the systems (both cultural and structural) by which we govern ourselves and, by extension, the practices of democracy are changing. This transition is multifaceted, involving visions of transformative change, new disruptive technologies, emerging political cultures, and long-standing legacy systems.

There is a general global dissatisfaction with political governance that can be described as a "democratic deficit." A democratic deficit describes a situation where, as common people's expectations and needs for greater political involvement increase, common people's real power in relation to their political systems decreases. Recent years have seen the rapid emergence of political movements against oligarchic power: principally the World Social Forum Process, Los Indignados, the Arab Spring, and Occupy Wall Street, but others which are widespread in many countries (Ramos 2010). Alongside this, new Web technologies are creating opportunities for experiments and innovations in public and participatory involvement in governmental decision-making, which are changing popular expectations. However, we have seen the continuing trend in the centralization, consolidation, and capture of political power by economic and political elites.

We are at a crossroads. Will we live in a world of oligarchs, where a super-rich and powerful class of people governs our planet? Or will the aspirations for

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distributed participatory decision-making create a world of deep democracy, where citizens have real *lateral* power in deciding the nature of their worlds? This chapter is organized to thematically clarify the issues and challenges that confront us. In the first section, an overview is given of the critical factors in the add-mix of change, which include disruptive technologies, the legacy of representative democracy and visions for deep and dynamic political participation. In the second section, I introduce the concept of "political culture" and "political contract," two key concepts that are used to articulate the transition from representative democracy to a new approach. In the third section, I use weak signal and emerging issues analysis to posit Liquid Democracy as indicative of a new wave in popular governance. In the last section, I develop several scenarios for the futures of governance and democracy, informed by a discussion concerning the evolving future Internet.

Methodology

This chapter uses three key methods to arrive at its findings. The first is called the "the futures triangle," developed by Inayatullah (2008). The futures triangle is an analytic tool that uses three categories:

1. Push of the present—the critical drivers of change,
2. Weight of history—the persistent and structural dimensions of an issue, and
3. Pull of the future—the visions of change which compel.

The futures triangle provides the context for the dramatic changes occurring around the world in the area of governance.

The second method used in the third section is weak signal (Hiltunen 2008) and emerging issues analysis (Molitor 2010). Weak signal analysis proposes that there are three critical lines in the identification of a weak signal, the (1) signal, (2) interpretation, and (3) observable issue. Emerging issues analysis provides a trajectory for the development of an issue, from its early development phase called "framing," to a popular debate and resolution phase called "advancing," to its political resolution "resolving" phase. Both methods help position Liquid Democracy as a prefigurative indicator of future political culture and political contract.

The third method used in the last section is a particular type of scenario development approach developed by Inayatullah (2008) and also employed by Ramos (2010), which analyses and integrates cultural strands in the development of visions of the future. In the method the first scenario is developed as transformative and idealistic—which captures the essence or spirit of a group of people and their aspirations. The second scenario explores and develops what that transformative and idealistic vision disowns, usually the functional legacy that is operant in the non-idealistic system. The third scenario develops an integration of the first two, where the transformative/idealistic and disowned are interwoven and where their contradictions are resolved. The fourth and final scenario examines a dystopic disintegration where competing forces are not reconciled and synergies are not achieved.

Triangulating the Futures of Democracy

In this section, I employ the futures triangle method developed by Inayatullah (2008). The futures triangle is a mapping method that provides a scaffold by which to explicate critical elements for a particular issue, and is often a useful starting point. The three elements used are: (1) the push of the present, more commonly understood as drivers of change; (2) the weight of history, the legacy dimensions of an issue that persist or resist change; and, (3) the pull of the future, the visions of change various peoples and communities are advocating for.

Push of the Future and Drivers of Change

There exists a long-term trend in the emergence of participatory democracy. After the student revolts of 1968 and the counterculture movement of the 1960s and 1970s, widespread dissatisfaction with technocratic and authoritarian approaches to governance emerged (Wallerstein 2004). Student protests and citizen-based mobilizations reinforced the lateral power of popular movements in shaping society. More recently the demand for participatory democracy has culminated through the World Social Forum process, initiated in Porto Alegre and inspired by the participatory economic democracy experiments there (Ponniah 2006), as well as the more recent social movements: Los Indignados, the Arab Spring, and Occupy Wall Street. These four examples share the common feature of having a networked organization that subverts traditional identity politics (i.e., the seeds of new grand movements) and challenge the centralized or oligarchic control by elites.

Over the last several decades a number of experiments have begun to be implemented in the area of participatory democracy. Within social democratic societies, there is an emerging expectation that citizens should be more deeply involved in decision-making across various aspects of life. Within nations typified by autocracy and oligarchy, there are expectations for more open, transparent, and accountable governments.

Alongside these rapid advances in technology emerging from digital technology, the emergence of home-based computers, social media, and more recently mobile networking technology are allowing for:

- Distributed collaboration,
- Easy access to governmental records and open data,
- Online opportunities for feedback, citizen engagement, and decision-making,
- Citizen campaigns and movement organizing.

We are seeing maturity and the push to implement applications for e-democracy (online systems) that work across institutional and organizational contexts—parliaments, parties, organizations, networks, and less defined communities. Developments in digital technology are playing a foundational role in helping to create a future Internet that empowers new forms of popular democratic engagement and a reimagination of governance for the following reasons:

- The practice and habit of using social media platforms is norming modes of *tacit voting* (the Facebook "like"), norming openness to one's political beliefs and values, and norming engagement in issues-based advocacy (e.g., Avaaz, MoveOn, GetUp! Action for Australia).
- Cloud-based computing is enabling a wave of applications that allow for dynamic deliberation and decision-making for a variety of groups and organizations—which complements (rather than replaces) face-to-face decision-making.

A number of strands that combine online participation and governmental decision-making have recently converged, such as strong advocacy for e-governance.

The Weight of History

In the West and other social democracies (e.g., Japan and Korea), the legacy of Republicanism is strong. The US representative system, for example, was designed to blend governance between a select group of senators and more popular house membership. The US Constitution and governmental system was founded on the premise that landed European males were fit to govern and all else were to be governed. Widespread citizen participation was seen as mob rule rather than the basis for wise government (Keane 2009). It would take several centuries to change the popular perception of democracy as a mob to democracy as a force for positive change, but the legacy of Republicanism continues to exist in most representative democracies, to varying degrees.

The systems of representative democracy emerged in the context of seventeenth and eighteenth century technologies. With the establishment of nation-states that encompassed extensive territories, such as France, the early USA, and others, and with limited means by which to communicate, existing technologies were limited to travel by horse and communication by postal mail. In the context of these technological limitations, representative democracy was a considerable social innovation. There was little alternative but to let a single person represent thousands of other people for a set number of years. That person would have to travel between the locale of the represented group and the locale of the representatives. Therefore, not only was there a perception among existing political leaders that governance should be the preserve of an educated and fit elite, but also there was the impracticality of popular engagement in decision-making.

Another important systemic legacy is the now almost universal convention around voting practices. In order to preserve the autonomy and the ability for an individual voter to exercise their conscience without coercion, the secret paper ballot is among the most important elements of the representative system of democracy. This particular systemic legacy becomes important when attempting to apply electronic forms of democracy.

Representative democratic systems have faced many problems and challenges over their recent 230-year history. In addition to the separation of powers that was

foundational to the establishment of early representative democracy, more recent changes in the twentieth century entailed what Keane (2009) describes as *monitory* democracy. This entails an elaborate system of institutions and processes that are designed to maintain the basic integrity of the representative democratic system. One of the most important of these monitory systems is media laws. In the aftermath of the great wars, monitory systems were designed to ensure that popular media were not co-opted by one or two special interests that capture the popular imagination. The German experience with Nazi propaganda and use of media led to social democratic polices that aimed to create media diversity, combat media monopolies, and channel funds for the development of educational programs, programs with a critical viewpoint, designed to educate the public about popular issues which are not biased toward one party or point of view. One of the most exemplary forms of this is Germany's *Grundversorgung* (universal service) legislation.

In the Westminster system of the UK, similar media laws have been established to provide the public with a broad-ranging and critical debate. The contemporary consensus is that, despite the development of monitory democracy, in the West, the legacy and triumph of capitalism has created a form of corporate plutocracy (rule by wealth). In the USA, accelerating from the 1886 ruling (Santa Clara County v. Southern Pacific Railroad) that established the legality of corporate personhood, corporate and moneyed interests have consistently had a major influence on policy (Korten 1999). While corporate power was somewhat restrained after the New Deal, it is again ascendant. The Republicanist legacy (not to be confused with the party) of many modern democracies has complicated this, as centralized/elite forms of decision-making are more easily co-opted by moneyed interests.

In countries like China and Russia, deeper participation in the democratic process is a threat to the vested interests of ruling elites. In China this includes the party apparatus and princelings, and in Russia this includes the 13 or so oligarchs. With the media well and truly tamed at the hands of the ruling elites, a popular understanding of democratic potentials may be stifled for many years. In states such as India, Pakistan, and Bangladesh, democracy is often looked upon with widespread disillusionment, seen as dysfunctional and inferior to a benevolent and wise autocracy.

Pull of the Future and New Visions of Democracy

In sharp contrast to many of the "weights of history," emerging visions for democracy portend dramatic shifts in the way societies consider governance, decision-making, and power. Key visions include: economic democracy, localization, global governance, and governance of the commons.

Economic democracy includes both workplace democracy (Albert 2003), which is the idea that workers should have decision-making power, and a broader participatory inclusion of citizens in local, municipal, and state budgeting of resources (Sharp 2011). The vision for economic democracy expands the involvement of citizens into processes for economic decision-making, whether through their organiza-

tions or through government. This is also connected to the cooperatives movement, as well as socialist strains of theory and strategy (Sklair 2002).

A related theme is localization, which holds a vision for subsidiarity in political governance. The main idea in subsidiarity is the devolution of political power to the most local possible scale (Hines 2002; Cavanagh and Mander 2003). While these proponents argue that many issues will need to be governed across large scales, they argue that issues that can be devolved to local scales should be. In addition, localization challenges the idea of a state monopoly on adjudication of boundary issues. In cases where a locality does not want, for example, a Walmart or McDonalds setting up a business, localization advocates argue that a locality has an equal or greater right to the adjudication of boundary issues than a state. This is understood acutely in the context of the neoliberal co-optation of the state, where a state monopoly on adjudication of boundary issues most likely favors neoliberal and corporate interests.

Reciprocally, another major vision is for global governance, reflecting the need to both tame globalization and to address many of the planetary challenges we face in the twenty-first century. Advocates for global governance argue we need to create global governance institutions that can do what states are failing to do (Held 2005). Globalization has accelerated a litany of ills such as sex trafficking, money laundering, use of tax havens, illegal toxic waste disposal, and exploitative labor practices (Ramos 2010). In addition, states are failing to address many global challenges, from climate change to deforestation to the large-scale destruction of oceanic ecosystems. Global governance proponents argue new governance institutions are needed that can address the transnational scope of globalization issues, as well as address planetary challenges that states are failing to effectively address. Some argue such a network of global governance is already coming into being through what is described as *cosmocracy* (Keane 2005).

Finally, over the past three decades, four categories of commons have each become critical areas of contestation, policy reformulation, and innovation in governance. These include governance of natural resources (precious metals, forestry products, etc.), governance of public goods (e.g., education, libraries, health services), governance of peer-produced resources (e.g., Wikipedia and Creative Commons), and governance of life support systems (atmosphere, ocean ecosystems, water, etc.). Commons are thematically diverse and differentiated, can work across multiple scales and themes, or can be localized. Therefore, the communities involved in governance are contextually specific. Governance of commons is not by a state or private entity, but rather by a community that has a particular interest and legacy relationship with the *commons* (Ostrom 1990; Bollier and Helfrich 2014).

Political Culture and Political Contract

The use of the futures triangle provided a context for the dramatic changes and factors for transformation to governance and democratic practice at a variety of scales and across themes. In this context, I argue in this section that we are experiencing a shift

from statist representative democracy, which is typified by anachronistic systems, an antiquated political culture, and oligarchic influences, toward a new mode of political practice and political culture, which can be understood through political innovations such as "Liquid Democracy."

Democracy, or popular self-governance, rests on particular *political cultures*. For a group of people to have the power and ability to exercise decision-making, particular values, attitudes, and ideas need to exist. The direct democracy of Athens required deep involvement. Indeed, in the Athens of antiquity, citizens were required to spend as much as 40 full days per year in civic dialogue, debate, and decision-making. Athenians even imbued democracy with religious sentiment: Democracy was an actual goddess that was widely worshiped (Keane 2009). In contemporary times democracy is also not just a practice; it is as well an ideology and vision of the future. There are many regions across the world that are democratizing and learning from their experiments, while at the same time in the birthplace of representative democracy—the USA—there exists a culture of political *infantilization*, the legacy of the spectacle of late neoliberal democracy, where apathy is more normal than engagement. One need only look at the voter turnout statistics.

Democracy is founded on political contracts, agreements between people and their institutions with regard to the exercise of power. A political contract is established when power is exercised by a particular group to formalize a new arrangement in governance that is more advantageous. Women's suffrage, for example, established a new political contract that enfranchised women in voting, making women regular and constant members of the voting public. The means was still via the representative system, a legacy of a previous contract, but those involved in voting changed, expressing a shift to the existing contract. The Magna Carta is perhaps the most famous example of the establishment of a new political contract. Strong political power, therefore, is the capacity to transform the political contract for a particular group of people, rather than the exercise of power from within the boundaries of an existing political contract. The Citizens United decision in the USA that opened the way for less transparent political donations and corporate influence is an adjustment to a political contract, a change in the rules by which power can be exercised within a political system, in this case favoring corporate and moneyed plutocracy (e.g., Citizens United v. Federal Election Commission).

The Crisis and Decline of Statist Representative Democracy

We are experiencing a crisis and decline of the statist representative democratic model based on two primary factors: First, representative democracy is anachronistic, a system designed for a previous era but hardly coping with the challenges presented today; secondly, power within the current representative democratic system is overly perverted by moneyed interests, mass media, and a restriction of party politics that cannot escape neoliberal policy making. As this crisis and decline deepens and accelerates, greater pressure will emerge to enact alternatives.

Crisis of Anachronism

Anachronistic elements in representative democracy include the context of transport and communication, the elitism of republicanism, the slow speed of decision-making, and a poor ability to deal with complexity and wicked problems.

It was developed at a time when travel was done by horse or boat, and where for a province or state to govern itself, representatives were needed to gather in a capital area. Today communication and collaboration happens at the speed of light, and distributed decision-making is a functional reality.

Representative democratic systems were designed based on the philosophy of republicanism, which held that popular democracy amounted to mob rule. Its systems are designed to be restrictive of popular decision-making. It was designed to maintain social order, rather than draw upon distributed intelligence. Today we are emerging into an era typified by the exercise of collective and distributed social (and machine) intelligences. Wikipedia has defied the critics, and we accept that self-appointed experts around the world will contribute their time and knowledge, which others will build on (or challenge), and the result will be trustworthy.

Representative democracy was created in the transition between agricultural and industrial economic systems, and the pace of change was slow if compared to the pace of change today. Social and technological change was far more gradual and decision-makers were afforded time to make decisions. Today the pace of change and innovation is fast, and requires not only fast and experimental policy development, but also anticipatory decision-making (Ramos 2014a).

Representative democracy, based on the Newtonian worldview of linear and knowable cause and effect, was designed to deal with low complexity and low interconnectivity. Today we find ourselves in contexts of high complexity, where issues are interrelated in dynamic and often difficult to understand ways. The era of the wicked problem is upon us. The outdated mental frameworks are incapable of adapting to a new reality.

Representative Democracy's Many Challenges

In addition to the problem of its many anachronisms, representative democracy also faces challenges on a variety of levels. First is the power of the mass media and its use by parties and corporations to influence public opinion and popular culture as a substitute for meaningful dialogue or debate (Herman and McChesney 1997). Second, we can see the influence of corporate and special interest money on politics and policy—the creation of the policy rich and policy poor (Ramos 2013). Third is the convergence (both left-right) into neoliberal forms of policy regardless of party. The triad of power among the political, corporate, and media/pop culture domains is currently involved in the practice of power maintenance, or *oligarchic capitalist reproduction*, rather than forging new pathways for a sustainable society or world (Robinson 2004).

Legacy of Monitory Democracy

Monitory democracy, a concept developed by Keane (2009), does provide context, boundaries, and integrity to the system of representative democracy that we have inherited. It can be, in some situations, a counterbalance to extreme oligarchic power. Monitory democracy is a complex system of processes, institutions and activities that developed after WWII, which redefined the very notion of democracy. Critical ideas in monitory democracy include the importance of basic education supporting a literate population, strict media laws that limit government or commercial propaganda, basic freedoms from hunger and depravation.

In some situations, such as postwar Germany, it is very effective at resisting and countering oligarchic influences. Media laws in Germany are among the strictest in the world, for example through their constitutionally embedded *Grundversorgung* laws. In other situations, such as in Australia or in the USA, oligarchic forces (e.g., Rupert Murdoch's 21st Century Fox/News Corp.) can significantly skew the field of debate and opinion and render representative democratic systems powerless.

Current representative democracies have complex and diverse monitory systems embedded within them. Because of the scale and legacy of the institutions of representative democracy and the monitory systems that surround them, we can expect them to remain in use for a very long period of time, even as they suffer crises in both legitimacy and effective functioning.

Liquid Democracy as Indicator of Change

The Liquid Democracy experiments are used in this chapter as an indicator for futures changes, an element prefigurative of possible future states, and a heuristic used to examine the potential futures of new political cultures and contracts. Charles Dodgson (also known as Lewis Carroll), the British author of *Alice in Wonderland*, first proposed the idea for transitive "liquid" voting in *The Principles of Parliamentary Representation* (1884). With the advent of digital technology, however, the technical necessities for creating such a complex and dynamic decision-making system became possible (Ramos 2014b).

Liquid Democracy applications were invented in Berlin, Germany, a product of both the hacker culture associated with Berlin (e.g., the Chaos Computer Club that also supported initiatives like WikiLeaks) and a grassroots political culture that was disillusioned with the left-right ideological dualisms and party system. It is based on cloud software systems that allow large numbers of people to propose, deliberate, and decide on the issues they face in their parties or organizations, for example a software platform called "Liquid Feedback" (Behrens et al. 2014). It was designed to make every user a potential politician, by combining direct and representative systems of decision-making. Any member can assign a proxy vote to any other member, thereby assigning a personal delegate, instead of voting for a representative.

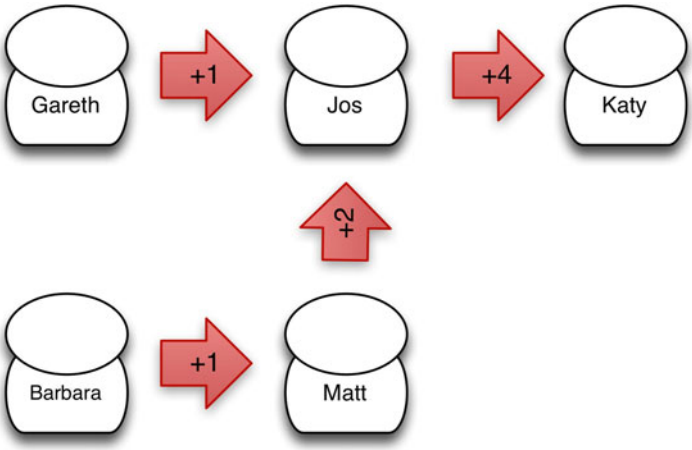

Fig. 11.1 Transitive voting system

A member can give their vote to another member for all issues, for a particular policy area, or for a particular decision for a limited length of time. That delegation can be rescinded at any time. Under this system, a person can become a delegate for multiple members within a polity very quickly (Fig. 11.1).

Because anyone can propose an idea and users can both deliberate on an issue or delegate this authority to others, it functionally removes the "representative" or "politician" from the system. A user can gain power through delegations and lose them just as quickly, hence the idea of a *liquid* democracy.

Liquid Democracy is a harbinger of change, or in futures-speak it can be considered a "weak signal." According to Hiltunen (2008), there are three main aspects of a weak signal: the signal (inter-subjective media), the interpretation (our subjective understanding), and the observable issue (the objective dimension). Our collective interpretations of Liquid Democracy are still emerging. While our technical understanding of "it" has been established, its implications, legal and social issues are still emerging. The signal has a "bellwether" quality, which is to say that media coverage of it is limited to a few countries (such as Germany) and limited to a few media channels, but is largely unknown elsewhere. Finally, its observable dimensions are still few, with a handful of applications: use with the German Federal Parliamentary Commission on the Internet and Digital Society,[1] application within the German Pirate Party, and some uses by councils, civil and business organizations.[2]

[1] Enquete-Kommission Internet und digitale Gesellschaft des Deutschen Bundestages (Federal Parliamentary Commission on the Internet and Digital Society). See http://www.bundestag.de/internetenquete/Adhocracy/index.jsp for more details.

[2] For example, the application of Liquid Feedback software in Friesland (Liquid Friesland) and use by the German Slow Food movement, as well as the German company Synaxon AG.

Implications of Liquid Democracy

Liquid Democracy, by virtue of some very significant differences that put it at odds with representative democracy, requires a fundamental shift in the existing political culture and contract to something very new. Taken as an indicator, Liquid Democracy augurs a future Internet of dynamic decision-making, fluid representation, and governance by collective intelligence. Liquid Democracy in its extensive form indicates the following changes:

1. The right to the flexible (transitive) delegation of votes, differentiated on issues and also revocable—currently people vote for a representative that they must keep for 3–5 years.
2. The right to a differentiated delegation of votes, a person can break up their votes to multiple delegates by issue, theme or conduct a general delegation—currently a voter assigns a representative the right to represent them on *all* issues.
3. Voting is allowed to be transparent—currently voting is sanctioned by law as anonymous via the secret (usually paper) ballot.
4. A law proposed and enacted via an online system is able to be binding—currently online decision-making largely constitutes recommendations and is therefore a reference system only.

Liquid Democracy is spearheading an emerging political culture. In research conducted in Germany (Ramos 2014b) on users and developers of Liquid Democracy systems, the following features emerged. Liquid Democracy represents a new political culture where people are more deeply, flexibly and continuously engaged with decision-making. Being involved in idea proposition, deliberation, delegation, and decision-making takes a lot more work than what is required in the currently dominant representative systems. For those who wish to delegate their powers to other members, familiarity with people and issues is still required and still exceeds the engagement most have in the currently dominant representative system. Liquid Democracy users are willing to accept the transparency of their involvement, as other users and members are able to see many of their decisions—the option of anonymity is limited. Like politicians, members must stand for their decisions by their name. Finally, there is an emerging expectation that decisions made on such a platform will translate to binding decisions. Up until now, online and virtual activity has been seen as less real than our physical reality. This dualism is being challenged by the emerging wave of IT developments, such as mobile networking applications (Instagram, etc.), collaborative work platforms, and online political lobbying. Over time, expectations are being created where human agency is extended through online systems, seen as entwined with the physical and co-originating reality—challenging the idea of cyberspace as an autonomous and separate reality—enfolding online political decisions as legally binding ones.

Developmental Trajectory of Liquid Democracy

Liquid Democracy is emerging in the context of existing and dominant political culture and political contracts, namely statist representative democracy in some countries, autocracy and oligarchy in others. As such, it will not supersede this systemic legacy—Liquid Democracy will need to negotiate a path from within the existing legacy. Molitor (2010) argues that emerging issues move through three primary phases in their lifecycle. The first is the "framing" where ideas emerge, prototypes and first inventions and applications are conducted, and an emerging pattern emerges that begs for understanding, similar to Hiltunen's (2008) category of "interpretation." The second phase is "advancing," where the issue becomes a subject of debate within society or among specific parties. Here, advocates and agents of change become important voices, organizations adopt or champion the issue or take a stance with respect to the issue, and catalyst events generate media which can influence the public. We are arguably already in this phase, but as the asymmetry widens between aspirations for authentic democracy and the limitations and dysfunction with representative and autocratic/oligarchic, this debate will become more widespread globally. Finally, the third phase, "resolving" is where the issue is reconciled within existing political systems. Because Liquid Democracy represents the need for a new political contract that cannot simply be resolved within existing systems (representative, autocratic, or oligarchic), this resolving phase will arguably entail political and social mobilizations and struggles that force a shift in the core rules of the game, much like the *Magna Carta* in England altered the landscape of social expectations in the exercise of power.

Broader Implications

Liquid Democracy is a subset of a range of shifts in governance, technology, and social change and, for the purpose of considering possible futures, it is useful to consider wider and broader implications in the convergence of digital technology, social innovations in governance, and changing social values, expectations, and political culture. Some of these shifts include:

As a reaction to both alienation from technocracy and national scale systems of (infantilized) voting, people want to be more involved in decision-making that is directly related to people's lifeworlds. This is expressed through innovations in participatory budgeting, but differentiated across a variety of social functions and themes, some of which have novel scales and geographies; thus,

Governance is differentiating across geographic scale and new spatial categories (from bioregional to global), but it is also thematically differentiated. Governance of social and ecological functions is forking into new geographic as well as deterritorialized configurations, which include oceanic, atmospheric, ecologically serviced, symbolic (shared religious), and other themes that do not conform to nation-state

systems and boundaries. Emerging social and planetary challenges demand new approaches to managing shared commons that cut across statist lines; thus,

Governing our social and planetary commons is the critical challenge of the twenty-first century. Because the legacy systems of monitory representative democracy will continue to operate for many years, and have been co-opted by capital or oligarchic factors, social movements will be required to forge new political contracts that open up social and ecological commons to participatory governance. This implies a complexification of governance jurisdictions, which in many cases will lead to conflicting claims over control and management, but which may ultimately be resolved by the parties that forge new political contracts ensuring their rights to govern. Online democracy systems may play a major part in the victory of communities' rights to govern variegated commons, by virtue of their speeds and (distributed) scales.

New collaborative endeavors are at the forefront of facilitating social change and require new powerful systems of decision-making. Transnational political organizations will require systems with speed and deliberative robustness to develop. Innovation and application of online governance systems is both driven by a demand for better social organization to govern commons, while simultaneously being potentiated by rapid advances in computing and software.

Scenarios

Using the scenario approach outlined in the methodology section of this chapter, four scenarios are outlined here. The first scenario is called "Liquid Revolution" and depicts an idealized future where democracy has radically changed, online governance is strong and variegated, and Liquid Democracy features prominently. The second scenario represents what the first scenario disowns, and is named "Steady-state Oligarchy," where statist, representative, pseudo-representative, autocratic, and oligarchic governance maintains power in alignment with neoliberal moneyed interests. The third scenario attempts to integrate the first and second scenarios, and is called "Partner State," drawn from Cosma Orsi (2009) Michel Bauwens' (2012) foundational theoretical work. The final scenario depicts a world where statist and liquid governance are in conflict and fundamentally dissociated, called "War of the Worlds."

Liquid Revolution

Neoliberal policy continued to strangle the state of funds, to the point where basic functions could not be carried out by state systems. States were also not able to manage disruptive ecological changes and extreme events, and new political communities emerged to address the crises. Commons based transnational design and production networks became the dominant form of enterprise.

It is 2050, and political power has shifted dramatically toward localized communities, networks of collaborating organizations, transnational production associations, and global governance institutions. State power has significantly weakened, with many features of the state now defunct. In the vacuum left by weak states, new political contracts have emerged where a variety of networks, corporations, organizations, and geographies use fluid forms of decision-making to enact binding policies. Political culture for many evolves toward deep and continuous engagement. Dozens of communities govern oceanic territories, the most prominent being Sea Shepherd, which governs over 20 % of the world's oceans with its fleet of ships in constant and fluid coordination. In a world of sporadic scarcities, membership into consumer cooperatives is high. Rural communities have formed systems of bioregional governance, to better address wicked ecological challenges. New global governance institutions spring up regularly, with massive financial backing from distributed citizens and organizations, one of the most interesting being the Citizens' Space Agency, which launches and maintains a plethora of satellites that serve a variety of purposes, and which governs the Free-Earth-Space-Station, which has an evolving and modular structure that allows partners to add modules flexibly—it is the largest space station, with over 100 modules.

Because there are no functional authorities (states) to adjudicate across multiple parties, and in lieu of state-based due processes, conflicts are common, and disputes are often settled by might—cyberattacks, choking supply chains and, in extreme cases, violence. Large-scale networks, some justice-based and others netarchical, exert great influence and push the limits of lateral power. Impartial arbitration organizations feature prominently, as ways in which parties can resolve disputes. But the field is uneven and there is not an operational common law or natural law. A mix between legal traditions is the norm, with commons-based law overlapping with positivist and natural. Despite this relative incoherence, the speed and flexibility of informational flows and online governance systems provide a global feedback mechanism by which liquid systems of governance allow the liquid form to quickly address power imbalances, often to the detriment of traditional (representative) modes of power.

Steady-State Oligarchy

There was widespread failure to reinvent a new political culture which demanded a greater say in the everyday affairs of people, and the perpetuation of political infantilization continued. The power of capitalism in inculcating a culture of consumerism continued to provide the "bread and circuses" that distracted people from basic opportunities for self-empowerment. Military and paramilitary brutality against those that attempted to enact new political contracts (similar to the treatment of the Black Panthers by the FBI, and Russia's secret service against dissident journalists) created an atmosphere of repression that stifled innovation.

It is 2050, and political power remains in the grip of states, in conjunction with moneyed interests. Online systems have advanced considerably, but communities have not fought for and won new political contracts that make online community decision-making binding or powerful. The influence on politics of online systems is superficial, mobilizing online petitions, wikis, and fundraising, but not able to influence neoliberal and oligarchic state policies. There is still a plethora of activity to lobby and influence the state, through representatives and officials, but the playing field means that neoliberal and oligarchic state policy continues and deepens. The majority still live in a state of political infantilization, showing up every 3–4 years to cast a vote, more and more in a state of apathy and resignation. Neoliberal and oligarchic policy is to use new and flashy online systems to provide people a sense of inclusion and consultation in policy, but these are highly managed forms of consultation, used to legitimize the existing policy regimes, not challenge them.

The steady-state oligarchy's strength rests on long-established systems that provide a clear and widely accepted system of rules. Where state systems are monitored by a wide variety of parties (monitory democracy), national communities are able to hold onto social democratic benefits. In many other places with weak monitory systems, neoliberal and oligarchic policy prevails, impoverishing new classes and communities. Between states and among states there is jurisdictional clarity, and this can facilitate trade and stability. But the system does not challenge many of the negative trends: rising inequality, poor policy responses to climate change and ecological problems, the application and ethics of disruptive technologies. Power continues to accumulate into fewer and fewer hands. US elections bring out fewer than 25 % of the voting population, a process now considered more of a ritual function. In China a handful and princelings, entrepreneurs, and party leaders wield almost complete power. In Russia the oligarchy has shrunk from 13 in 2014 to only 7 in 2050. In the Eurozone power has become more vested in the EU bureaucracy. Attempts to create communities that govern various commons meet with little success. As such, governance systems have little or no precedent and legitimacy within the dominant state systems.

The Partner State

Citizen movements and mobilizations continued to learn and evolve toward more effective strategies at making political gains. The Occupy Wall Street and Arab Spring uprisings formed learning opportunities used by subsequent generations to carve out new political contracts. The economic logic of autonomous governance units pushed states to encourage and support them. It was far too difficult for states to suppress the speed and influence of these new networks anyway.

It is 2050 and around the world a new political contract has been won through hard fought struggles within existing state systems, which open up opportunities for a variety of communities to govern their own commons, using a variety of means at their disposal, many of which use online and fluid decision-making platforms.

The state, at the highest level, accepts and supports variegated community commons governance arrangements that scale from the local, national to the transnational and global. Recognition is achieved that new online technologies allow for dynamic and cross cutting communities—which require self-organization capabilities, but which also wish to enact change upon the world. The state becomes a supporter and facilitator of many types of communities which attempt governance of themselves and their overlapping commons. It offers resources, legal support and adjudication, education and regulatory institutions. Constitutional changes make oligarchic cooptation difficult in future—states are surrounded by monitory democracy systems that damper the influence of moneyed and special interest. Commons governing efforts have a strong foundation within state law and are increasingly synchronized or partitioned with legacy systems (social democratic and neoliberal).

Early in the twenty-first century states like Ecuador led the way with their FLOK project—which aimed to create a state-supported knowledge society. By the mid-twenty-first century, most states had been won over to various forms of state-supported autonomous governance. The most effective of these go far beyond sanctioning online and commons-based governance systems, but actually nurture and support them. The logic is clear: communities taking responsibility for governance of various commons takes pressure off the state, reduces costs, and empowers citizen participation and creativity. Where boundary issues arise, as is often the case with the variegated jurisdictional boundaries of self-generating communities, the state plays the important role of impartial adjudicator. In states like China, the state devolves its overall governance to new communities but maintains its tradition and systems of autocracy. In a radical move, communities straddling the Yellow river form a liquid governance system called the Yellow River Management Cooperative, prompting local officials to arrest instigators and initiating an epic media and court struggle. Under pressure from citizens to address corruption and the excesses of industrialization, the state ultimately sides with the cooperative and jails many of the corrupt local officials, labeling the cooperative initiators as "patriots," prompting a wave of other citizen actions.

War of the Worlds

Privileged elites remained unwilling to make compromises to the political contract. Poor strategy and a lack of determination on the part of social movements led to a failure to target the state as a key locale for power. A political culture that disowned state law and state power, and opted for "autonomous" communities emerged. This led to an emerging schizophrenia of power between autonomously governed communities and states.

It is 2050, and the world experiences an ongoing and protracted conflict known as the "*War of the Worlds*." The state and a variety of autonomous communities compete intensively for legitimacy, resources, and power in the governance of the

world. While social movements drive dissent and pioneer new political contracts to enfranchise new types of community governance, the state in association with money-eyed interests closes ranks, unwilling to share legal powers or concede political privileges. Hundreds of autonomous and networked communities with sophisticated governance systems emerge to address a variety of social and ecological needs, but are never offered legitimacy and support, and are actually undermined by the state. Social movements did not learn from Occupy Wall Street. Instead of coherent demands by social movements to shift the political contract, issues and demands are fragmented, and there is a tendency to give up on changing the terms of the state system, and instead forge ahead with autonomous and networked efforts. This results in extensive conflict between states at the level of law and enforcement, where new communities with self-governing capabilities enact law and also enforce it within jurisdictions that overlap with existing state law and enforcement systems.

One of the most extreme cases involved the North-Eastern Bio-Regional Governance Collective (NEB for short), a group with tens of thousands of members across the US Great Lakes and New England areas. NEB is self-chartered to use bio-regional governance strategies to address socio-ecological challenges and issues, which both enact bio-regional management policy, and also enforce it through a network of dedicated and local volunteers. A number of states had attempted to restart gas fracking activity, opposed by most residents, but which had been re-legalized by virtue of the influence of the mining lobby. Neither states nor the NEB accepted the legitimacy of the others' policies, and as mining companies began to move into various regions to begin operations with the protection of state enforcement, violent clashes erupted between NEB and state law enforcement. Before the state could send in reenforcements, thousands of "freedom fighters" were pouring into the North-East to fight alongside NEB.

In this future, states attempt to use a divide and conquer strategy of allying with one self-governing community, but quarantining the more radical. Without a well-established system by which different communities can address boundary issues and disputes, conflict is common between emerging communities. Likewise, to counter the power of states, self-governing communities link together in vast networks, some geographic, others thematic, and others a mix, to leverage scale and capabilities. These complex mega-networks are emerging collectives that are able to exert power and claim some victories in the face of state intransigence.

Conclusion

The key conclusions from this research are summarized through the following points:

- We are witnessing a shift from the statist system of representative (republican) democracy that emerged from the enlightenment, toward new (post-republican) possibilities signified by the movements for participatory democracy and the emerging possibilities of the World Wide Web and network-enabled collaboration.

- Experiments with Liquid Democracy and transitive voting are indicative of this shift, through the experiments conducted through Liquid Feedback and Adhocracy software, and other systems.
- These experiments highlight the distinction between shallow political participation and deep democracy—and augur both new political cultures and political contracts where they can be enacted.
- The diversification and fragmentation of existing systems of governance provides the basis for a number of possible future scenarios—with implications for how the state is engaged with governance of shared commons and emerging transnational governance systems, to name a few.

The evolving possibilities of the Internet have empowered a new wave of participation and decision-making; understanding change more holistically, however, requires us to couple the inquiry on technology with an inquiry into cultural dynamics and the contemporary challenges we face. Indeed, the political power of the 1 % is on a collision course with both emerging technologies, the aspiration for genuine participation, the challenges and opportunities humanity faces, and the need for dynamic and global responsibility.

Given this admix of change, and the absence of a clear future outcome, the critical factor is our ability to organize ourselves for the future that we want, and develop a sensible program of change. The future of democracy and the Internet is in our hands, hearts, and minds.

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Chapter 12
The Liquid Self: Exploring the Ubiquitous Nature of the Future Internet and Its Pervasive Consequences on Social Life

Enric Bas

"Navigare necesse, vivire non est necesse"
(Navigating is necessary; living is not)

- Plutarch-

Introduction: Reality as a Construction

As Peter Berger and Thomas Luckmann wrote in their introductory note to what is regarded as probably the most important contribution to the Sociology of Knowledge: "What is real for a Tibetan monk may not be real for an American businessman" (Berger and Luckmann 1966, p. 15). Social reality is a relative matter—that is what they meant. In their book they analyzed how persons and groups coexisting within a social system create concepts or mental representations of each other's actions through their reciprocal interactions. Once these roles have been collectively assumed and internalized with the passage of time, they become a social norm that is taken for granted. At that point, meaning is embedded in society and reciprocal interactions can be said to have become institutionalized. Reality is therefore socially constructed through the definition of those social institutions that articulate social life—as a kind of cultural backbone.

This chapter is dedicated to the memory of my very dear friend Anita Rubin, from whom I learnt so much both as a futurist and as a human being. Kiitos paljon, Ani!

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The transmission of values and norms articulating social life is based on the socialization process, both in a primary phase (during childhood) and in secondary phase (any subsequent process that may induct an already socialized individual into new sectors within their society). Such life experiences linked to the socialization process will produce a cumulative knowledge that determines one's own perception of social reality and the institutions in charge of structuring it. Therefore, our perception and understanding of economy, religion, education, politics, security, gender, race, friendship, love and marriage, family … is going to rely on our socialization process, on our accumulated knowledge and experiences.

According to George H. Mead (2009), it is social experience that shapes personality and we build our social world through the meaning that we give to things. This is only possible thanks to our symbolic capacity, which allows us to build our own personality, while simultaneously building our social world: no personality can be built outside a society. Awareness and the image that each individual has of himself or herself constitutes what Mead calls the *self*, a dimension of personality which cannot exist outside society because it has an organic base: it can only take place inside society through a symbolic exchange. In Mead's opinion, this individual process that leads to building the *self* (a way of thinking, a personal identity) is socially relevant as it represents a preparation for social action: Any actions that are meaningful for those who perform them affect the behavior of others and orient the action mentioned by this affectation (Runciman 1978).

In light of the above, the individual (self) and social (institutions) levels would be intertwined insofar as the individual level is somehow determined by the social level and, at the same time, the social level is determined by the individual level by means of social action. Structure and action can be seen as two sides of a coin: structure makes social action possible, but social action creates structure (Giddens 1979). This dialectical connection between individuals and social systems becomes essential for understanding the systemic dynamics and processes of change at local, as well as global, levels with regard to the future Internet.

The structure/action dialectic is key to understanding social change in general across human history, but is even more relevant when trying to approach late modernity. As Zygmunt Bauman (2007) pointed out, this stage of history is allowing us to witness the rise of different—highly interconnected—processes that shape a brand new scenario where individual decisions should be made without having any previous references, which means facing unseen challenges. It is what Bauman (2007) referred to as *Liquid Modernity*, characterized by the progressive and inexorable dissolution of every previous reference (social institutions, structures and models) that used to articulate social life by providing a framework to limit individual decisions and, consequently, to orient social action.

Nothing but change can be taken for granted in this new form of society, where the only constant is change and the only certainty lies in uncertainty. Since nothing lasts long enough to become a reference framework, flexibility (i.e., the ability to adapt to change) appears as the only solid norm; this may sound like an oxymoron, but actually it is not. Society is not seen as a *structure* but as a *network*, a matrix of random connections and disconnections with an infinite number of possible

permutations. The word "community"—understood as a group of individuals belonging to a solid structure linked to a specific physical place where all members share norms, values, and social institutions, have a shared future vision, and give mutual support to each other—gradually loses its meaning in this context, mainly because this way of understanding the concept of community is based on long-term action, which very often goes beyond generations.

Although network analysis as a method to study social interactions in sociology is not originally based on the widespread utilization of computers or the Internet, ICTs have played a determining role in the consolidation of this *Liquid Society* where networks (flexible and changing) are progressively replacing structure (solid and recurrent) as the main conceptual issue of reference when it comes to mapping social interactions. Such Liquid Society could not exist without the presence of two elements: (a) telecommunications; and (b) the Internet. The same holds true for the *Liquid Self*, which has been defined as a new stage where the main shift has led towards apps that let you introduce yourself to different people in different ways and at different times (Fizz 2014).

The Internet that society can take advantage of nowadays is perhaps the most transforming technology ever created by human beings, insofar as its multidimensionality affects social life. Most importantly, its unlimited potential to combine with other technological advances creates synergies of unforeseeable consequences. The Internet has changed everything, alternatively shrinking and accelerating the world that was known to us so far. However, this is only the beginning of a new era: the biggest and most radical changes are yet to come. Both social organizations and individual identities will probably be reshaped until they become unrecognizable, both of them induced by a continuous feedback between them—a dialectical process that is bound to run faster and deeper than ever. Social life, and even human life, will jump to a different stage. Merging the Internet with artificial intelligence (AI), biotechnology, and robotics will bring about a dramatic change not only in terms of how people interact (and societies are formed) but even regarding human nature. The future of human beings and societies is inextricably linked to the future of the Internet.

The Inexorable Change: Or How Structures Are Dissolving into Networks

Faster than Ever

One of the main transformative strengths that characterize the Internet lies in the speed with which it has taken over the world. Together with cell phones and personal computers (PCs), the Internet can be regarded as one of the most disruptive technologies ever, according to its adoption curve. As shown by Peter Brimelow (1997), the Internet reached 25 % penetration in the USA in 1997. Its adoption, defined here as where at least 40–50 % of the population adopts the technology, was faster than that of any other previous technology: it only took 6 years. The adoption

of other relevant technologies took much longer, as illustrated by the following examples: cell phone (14 years); PC (18 years); television (25 years); radio (27 years); microwave (31 years); telephone (37 years); and automobile (62 years).

According to the same source, the number of Internet users (individuals of any age who can access the Internet via any device type and connection) has grown exponentially in the last 21 years, going from 14,161,570 users (0.3 % of the population in 1993) to 2,925,249,355 users (40.4 % of the population in 2014).

Another relevant, and perhaps even more important, piece of information is the distribution—both in relative and absolute terms—of users currently accessing the Internet worldwide by country (Internet Live Stats n.d.). A quick review of the statistics can give us a number of interesting insights:

1. Almost half of the users currently accessing the Internet come from Asia (48.4 %), followed by those coming from America (21.8 %), Europe (19 %), Africa (9.8 %), and Australia (1 %).
2. Most of the countries with more than three quarters of their population accessing the Internet are developed ones (the USA, Japan, France, the Netherlands, Australia, the UK, Germany), with Canada and South Korea exceeding 90 %.
3. The top ten countries ranked in order of total number of users accessing the Internet are: China, the USA, India, Japan, Brazil, Russia, Germany, Nigeria, the UK, and France.
4. China has almost three times as many users as the USA; and Nigeria has more users than the UK and France (and of course, South Korea, Australia, or Canada)—even though Internet penetration only reaches 37.59 % of its population (unlike what happens in the UK and France, where that percentage rises to 90 %). The case of India is even more relevant, insofar as it ranked third in absolute terms (after China and the USA) but, in relative terms, less than 20 % of its population has access to the Internet.

Thinking in terms of Liquid Modernity, this information suggests the possibility of a radical, upcoming transformation. If the notion of network soon comes to prevail over that of structure—the quintessential concept around which society has been articulated till now—the global power balance based on knowledge access may change dramatically in the near future. This is not about which countries have more access to the Internet in relative terms, but rather about how many people have access to the Internet in absolute terms, within a true global economy.

New Actors

The more people using the Internet the greater the likelihood of new ideas emerging that lead to new businesses able to transform social life. If there are more people (in absolute terms) using the Internet in countries such as India, Nigeria, or Israel, most of the ideas will likely come from those countries. Therefore, despite the facts that a very large proportion of the most relevant and biggest companies worldwide—including

Internet companies—are still in the USA and that Silicon Valley, where venture capital meets innovative geeks, continues to be the place to be for entrepreneurs, two trends can be considered in relation to the possibility of a model reconfiguration (towards a more liquid one) in the coming future:

1. Scale in innovation is changing from national/ethnic to human. Being innovative has nothing to do with the country where you were born: It has to do with your personal individual skills and networks. Robert Lenzer (2013) argues that the traditional trend of immigrants becoming entrepreneurs in the USA (due to the fact that the USA is basically an invented country formed by immigrants and their descendants—he mentions Procter & Gamble, Pfizer, and U.S. Steel as examples of this trend) has grown over the last two decades, not only because 25 % of the high tech companies had at least one immigrant (e.g., Google, eBay, and Brightstar), but mainly because "75 % of the companies funded by American venture capital had one core foreign-born team member as their CEO, CTO or VP of Engineering" (para. 2). Lenzer underscores the lack of STEM—Science, Technology, Engineering, or Mathematics—graduates among the American students, and the growing rate of foreign students interested in such topics, both those studying in the USA (about 60 % of them joined STEM programs) and those studying in their home countries.
2. Technology incubators are emerging in the world's least expected places. Venture capital still seems to be more confident and better connected with the traditional innovative epicenters, mainly based in developed countries, but both the World Startup Report (The Economist 2014b) and the 500 Startups Project (McClure 2013) show a changing scenario with an increasing multiplicity of foci and the growth of outstanding initiatives related to Internet development across various geographical areas. This reveals a new context where priorities change and transnational venture capital and investors will operate at a truly global scale.

Therefore, one can easily see how structures are leading into networks as a framework for action, while new actors (people and places) are coming into play in the extension of the Internet. Rigid patterns are leading to flexible bonds, de facto *transcending* the traditional coercive structures and institutions (states, laws, etc.) This is thanks to the fact that this last stage of our capitalism, referred to as the *Post-industrial Society* by Daniel Bell (1973) and as the *Information Age* by Manuel Castells (1996), is being ultimately built on the basis of total flexibility, a boundaryless global vision, the radical and unlimited use of pervasive ICTs, and multiple possibilities to merge with other technological and scientific advances.

The Hydra Effect

There has been an entrepreneurial explosion worldwide regarding the virtual realm. A recent report on technological startups (The Economist 2014a) described it as "a Cambrian moment," metaphorically drawing a parallel between the current moment

in digital entrepreneurship and what happened on Earth about 540 M years ago, when a multiplicative effect produced an amazing variety of species in a short period of time, radically altering life on the planet. According to this report "digital startups are bubbling up in an astonishing variety of services and products, penetrating every nook and cranny of the economy" (para. 2). Despite that 90 % of the digital startups tend to fail and are unsuccessful—as is said in this report—the current volume of initiatives keeps growing at an incredible pace.

Taking as a reference the contribution made by John Webb (2014) along with the data provided by the Online Global Report (Reynolds 2002), 1.35 million technological startups opened each year in 2002—this being an approximate figure, since figures either did not exist or had not been compiled for most countries. As implicitly suggested in this report, those enormous numbers are fuelled by the emergence and the increasingly prominent role of new actors; while the entrepreneurship ratio in traditional areas (like the European Union, the Commonwealth or the USA) ranges between 5 and 10 % (of adults, from 18 to 64 years of age), it reaches nearly 15 % in Latin America, and even more in developing Asian countries. It should additionally be stressed that this report was made shortly after the Internet bubble of the 1990s and before the appearance now widely used social media such as Facebook and Twitter, which make it possible for people to interact with one another.

Digital interaction or, expressed differently, the creation of formal or informal bonds by means of social networks, has been essential to develop the kind of *creative/innovative ecosystems* where those startups grow. Such ecosystems mostly have their headquarters in incubators or accelerators run by universities with the support of existing companies and private investors—though their main strength lies in the fact they are highly interconnected worldwide. Now you can create your own startup on the basis of an original idea without being based in Silicon Valley. You could be in Malaysia, Kenya, Spain, or Iceland and run your business. In this regard, social media have been a boon for global entrepreneurship as a whole, and they will surely be one of the key factors for the exponential growth of the digital sector itself.

As pointed out by Zwilling (2013), the convergence of some different factors—amongst them the loss of ability to innovate in large corporations, the real globalization of capitalist economy through its transformation into a single market, the rising number of incubators and accelerators, the availability of venture capital investments for the early stage, the low costs involved in creating a startup, and the potential spreadability of social media—have triggered a sort of *revolution* in the global economy, fuelling entrepreneurship and propelling it higher than ever before.

Coming back to the structure/action dialectic, what level of influence is exerted by this Cambrian moment in which thousands of startups are individually creating thousands of applications every day? In only several years, the world has passed from a situation where the software available was reduced to very few options (operating system, word processor, browser, etc.) to a new scenario with 1.3 million apps available for Android users and 1.2 million for those using Apple (Statista 2015). The contrast between this information and the data provided by *Forbes*

Magazine (Jones 2013) shows that it only took 7 months to move from 1 million apps to 1.2 million available in the Apple Store. This means a 20 % growth in roughly half a year, or approximately 25,000/30,000 new apps per month.

The synergy created by the merging of technologies (the Internet, mobile devices, and computers), together with the proliferation of products delivered by those start-ups working in creative industries, has resulted in a huge flood of apps and an exponential software volume increase. There are apps to deal with almost every aspect of human existence, from the most serious to weirder ones—a scenario where both social and private life must be relentlessly managed through this amazing swarm of bees with unexpected consequences. For instance, you can currently find an app to confess your sins—and get your penance and absolution—without seeing a priest or going to church. You can even talk to God (e.g., *Confessio*) or play with your cat virtually—that is, without playing with your real cat (e.g., *Game for Cats*). Both of them are available at the iTunes App Store.

And the big question is: how does this context affect the self? How can it possibly affect self-perception, individual identity, free will, or interaction with others and, consequently, to what extent is this process likely to transform social life? Will the amount of information—and the apps used to manage that information or to gain access to it—improve quality of life? For the time being, and in accordance with the last report issued by the International Association for the Evaluation of Educational Achievement (IEA 2014), it seems that only about 2 % of students in the developed world learn how to distinguish relevant online information (and thus demonstrate critical thinking) from the irrelevant.

Ubiquity

There are currently about three billion Internet users worldwide, approximately 40 % of the total global population. Just 20 years ago, the percentage of people with Internet access only amounted to 1 % (Internet Live Stats n.d.). Rooted in the military need to develop a secure environment for the protection of strategic data while being immersed in Cold War, the Advanced Research Projects Agency (ARPA), linked to the Secretary of Defense of the US Government, created the ARPANET in the late 1960s. Early protocols such as Network Control Protocol (NCP) and, since 1982, the Transmission Control Protocol/Internet Protocol (TCP/IP) suite made possible an independent system for data exchange between computers and local networks. After its establishment and growth in Europe from the end of the 1980s through the 1990s, the Internet reached Asia, Oceania, Latin America, and Africa, transforming what once was a hodgepodge of independent networks into a truly global entity before the turn of the century.

Originally concentrated on military and education/research areas and banned to commerce (Internet Service Providers were formed during the late 1980s, but only as a means to provide service to regional research networks), the Internet soon

became open and public dialups entered the market, 'The World' (http://www.std.com/) being the first one to offer this service in 1989. This was not only the real starting point for what is known as the Internet at present but also the origin of a process through which a multiplicity of uses was progressively integrated into the Internet: from an academic use to a commercial and informative use, and then to a social and entertainment-oriented use. This third stage in the proliferation of Internet use (led by social media and entertainment) was essential for the definitive expansion and democratization of the Internet as it is known to us now. The Internet subsequently became a *must have* around the world and, ultimately, a substantial part of popular culture: the tipping point towards ubiquity.

In 2015, a number of driving forces fuel the process that leads to total ubiquity, a total integration of the Internet into our living (both private and professional) routines, through the convergence of physical and virtual worlds. At least five of those driving forces should be outlined here:

1. *Rise of wireless*. Even though wired connections have been substantially improved and are still the backbone of the Internet, wireless technology is evolving in a way that may radically change the scene: Wi-Fi is moving from being a complementary tool to becoming essential. Technologies such as Long-term Evolution (LTE) and WiMAX pave the way to accessing the Internet wirelessly at speeds comparable to broadband connections, which is extremely relevant since portable devices (smartphones, laptops, and tablets) will be the dominant connection tool by 2020 according to the Pew Research Center (Rainie and Anderson 2008). This means having the possibility to log on to the Internet anywhere and at any time.
2. *Total access*. Although there are still large geographical areas (mainly rural and/or undeveloped ones) with slow access to the Internet, or even no access at all, some initiatives have been undertaken with the commitment to spread the Internet to every place on the planet. The Alliance for Affordable Internet is the world's broadest technology sector coalition, and its vision is "everyone, everywhere, to be able to access the life-changing power of the Internet affordably" (n.d., para. 1). Amongst its technological sponsors and members, Google, Alcatel-Lucent, Cisco, Microsoft, Intel, and Facebook stand out. The main private sponsor, Google, is developing 'Project Loon',[1] its own side project based on the massive utilization of high-altitude balloons placed in the stratosphere to create an aerial wireless network with 3G-like speeds. Anybody could log on to the Internet anywhere on Earth—and beyond. In the words of Vint Cerf (widely known as one of the "Fathers of the Internet," and co-designer of TCP/IP protocols and Internet architecture), Vice President and Chief Internet Evangelist for Google: "there is a chance for an Interplanetary Internet" (Mann 2013, para. 3).
3. *Instant connection*. Bell Labs recently announced a new 10 Gbps world record broadband speed for data transmission over copper telephone lines (Alcatel-

[1] http://www.google.com/loon/

Lucent 2014), which meant a big step towards fast connectivity. However, science research is reaching speed levels that still cannot be assumed by the commercial infrastructure—though it will probably not take long before that is possible. For instance, it was announced 6 years ago that Bell Labs had also broken the optical transmission record, 100 Petabits per second kilometer, which was said to outperform the most advanced commercial undersea cables by a factor of 10 (Phys.org 2009). Therefore, it is only a matter of time before speed reaches unknown limits.

4. *Technological synergy*. It becomes of paramount importance not to miss the context of scientific and technological advances where the Internet is evolving. The Internet is not an isolated phenomenon—despite being the best known and the most visible one—but only one amongst the main drivers of change. A combination between Internet ubiquity and biotechnology could facilitate the automation of processes in a broad sense (solving one of biotech's long-lasting problems: reproducibility—as human beings make mistakes). Likewise, it might help virtual reality (the replacement of the real world by a simulated one) to combine with augmented reality (the modification of perception by using computer-generated sensory inputs that complement the real world): artificial information about the environment and its objects could be overlaid on the real world (Azuma 1997). All of this could merge with robotics, artificial intelligence, and 3D printing technology, with the aim of producing plausible innovations: intelligent software programs; holograms used in visual online communication; and online teleportation of tangible objects (Epstein 2014).
5. *Virtualization of social capital*. As for the current and future impact of the Internet on social capital (interaction, participation, commitment, trust, sociability, etc.), this issue has already been treated in several interesting and exhaustive empirical works (Wellman et al. 2001; Ellison et al. 2007) belonging to the field of social sciences where both worlds (virtual and real) are seen as complementary. A recent working paper published at the Leibniz Institute for the Social Sciences (Sabatini and Sarracino 2014) had the following question as its title: "Will Facebook save or destroy social capital?" Perhaps one might have to add something like "as we know it." Social capital is exactly like energy while the human being exists; in other words: it can neither be created nor destroyed, but just transformed. Thus, one should consider the possibility of a progressive virtual substitution of the real, their complementarity being nothing but an interlude between both worlds in the arrow of time. What cannot be denied is that social capital is being increasingly generated within virtual environments since social life is also increasingly developed in—or through—virtual environments. Perhaps the point is not so much whether the virtual affects the real (as something taken for granted is essential and will last forever), but rather if a process of merging and dissolving the real world into the virtual one takes place.

Towards Post-humanism?

Empowering Machines

Back in 1999, and with the precedent of D2D (device-to-device) communication, Kevin Ashton of the Massachusetts Institute of Technology's Auto-ID Center proposed the term *Internet of Things* (IoT) during a presentation for Procter & Gamble. Ten years later, in an attempt to provide a better explanation about the actual meaning of this concept, he wrote the following:

> Today computers—and, therefore, the Internet—are almost wholly dependent on human beings for information … The problem is, people have limited time, attention and accuracy—all of which means they are not very good at capturing data about things in the real world … If we had computers that knew everything there was to know about things—using data they gathered without any help from us—we would be able to track and count everything, and greatly reduce waste, loss and cost … We need to empower computers with their own means of gathering information, so they can see, hear and smell the world for themselves, in all its random glory … (Ashton 2009, para. 2, 5)

The IoT will most probably become a reality quite soon due to the rapid advances in increasing transfer speed, accessibility, and connectivity. And such technological advances are considered to be potentially interesting to achieve a better life: They will surely be welcome in daily routines by individuals, thus transforming the way that social capital is understood.

Cisco (2015) defines the *Internet of Everything* (IoE) as bringing together people, processes, data, and things to make networked connections more relevant and valuable than ever before—turning information into actions that create new capabilities, richer experiences, and unprecedented economic opportunity for businesses, individuals, and countries. At Cisco Live, CEO John Chambers said: "The simple concept, as you move forward with IoE, is that you have to get the right information at the right time to the right device to the right person to make the right decision" (The Economic Times 2014, para. 10).

This IoE proposal, despite the existing open discussion about whether IoT and IoE are the same thing or not, is interesting since it explicitly incorporates people into the equation. Under this perspective, the IoT (connecting machines with machines) could be considered as a kind of preliminary step to the wider vision of the IoE (connecting machines with machines, persons with persons, and machines with persons). This could mean a kind of first step to integrate machines and humans (even animals) as nodes of a total network: nodes with unique identifiable embedded devices, wirelessly connected to the Internet, which can send or receive information without the need for human intervention. This is what ubiquity means: Internet everywhere, all the time, for everybody and everything, probably without the option for voluntary disconnection.[2] The IoE is exciting, and frightening at the same time.

[2] It is not unreasonable to think about this possibility given the well-known difficulties of erasing traces and profiles in social networks and apps.

Noosphere

This ubiquity poses new challenges, not only related to those already existing about security, privacy, or identity, but also philosophical ones. And those challenges come mainly when you consider the plausible synergic convergence with other technologies such as Biotech (artificial devices embedded in live bodies, biological devices, etc.) or AI (intelligent hardware/materials, intelligent software, etc.) In a recent article, journalist Lee Bell (2015) wrote, "Paul Coby, speaking at the IoT Summit in London, cited Stephen Hawking, Bill Gates and Elon Musk, all of whom have warned of the dangers associated with developing computers that can think for themselves" (para. 2). And, as Bell points out referring to Coby's speech, when all those guys agree on something, it is worth paying attention.

Twenty years ago, Jennifer Cobb wrote an essay entitled "A globe, clothing itself with a brain" for *Wired Magazine* (Cobb 1995) where she explained the vision developed by philosopher of evolution Pierre Teilhard de Chardin in the 1940s. Teilhard, who influenced thinkers such as Marshall McLuhan (in *The Gutenberg Galaxy*) and Al Gore (in *Earth in the Balance*), described a global sphere of thought, a living unity containing all our collective thoughts, experiences and consciousness, which he called the "noosphere" (mental world), as the evolutionary step beyond the geosphere (physical world) and biosphere (living world).

Outstanding philosophers such as David Chalmers, and neuroscientists like Christof Koch, who works as the Chief Scientific Officer at the Allen Institute for Brain Science, have tried to approach the problem of consciousness (learning process, storage of memories, perception, and feelings, both in humans and computers) by exploring the notion that all things in the universe might be, or potentially be, conscious providing the information they contain is sufficiently interconnected and organized. And, if so, could we be in the midst of a path towards a *conscious web* where the Internet becomes artificially intelligent? Towards a kind of 'global thinking layer,' an emerging Noosphere? (which takes us back to Teilhard de Chardin). Maybe we are standing on the threshold of a breakthrough not just in the field of technology (AI, IoT, IoE, etc.) but also in our understanding of consciousness itself.

Singularity

Both Koch's work (2011) and that of Chalmers (2010), despite reflecting different approaches or ideas that are sometimes divergent, have been connected with computer consciousness and the Singularity. More than 30 years have elapsed since mathematician and computer scientist Vernor Vinge explained what the Singularity is at the "VISION-21 Symposium" sponsored by the NASA Lewis Research Center and the Ohio Aerospace Institute. He stated that we are on the edge of a change comparable to the rise of human life on Earth and made a terrible forecast: "Within thirty years, we will have the technological means to create superhuman intelligence. Shortly after, the human era will be ended" (Vinge 1993, para. 1).

Vinge's prediction has not yet come true, but that does not necessarily mean that it is obsolete, at least in its formulation of a plausible scenario for the long term. The prediction made by Vinge does not imply a value judgement, at least not explicitly. Nevertheless, the mere possibility of having intelligent, self-conscious, supercomputers obviously has led to a big debate, where both dystopian and utopian visions arise. If machines became intelligent and made their own decisions, what would the role of humans be then? Could we control these machines anyway? Should humans fuse with them perhaps? Would this human/machine fusion happen anyway? If so, are we already immersed in this integrative process?

In April 2000, Bill Joy, Founder and Chief Scientist of Sun Microsystems, issued a warning about the real possibility of twenty-first-century technologies threatening to turn humans into an endangered species (Joy 2000). It may sound too dark a future, but the feasibility of this proposed scenario is defended even by the most optimistic scientists and visionaries, amongst them Kurzweil (2001). The fear of humans losing control, which would consequently lead to their actual disappearance as a species (as it is known to us) logically stems from the plausibility of reaching a level of technological change that humans could not possibly assume.

In Kurzweil's words:

> The Singularity is technological change so rapid and so profound that it represents a rupture in the fabric of human history. Some would say that we cannot comprehend the Singularity, at least with our current level of understanding, and that it is impossible, therefore, to look past its *event horizon* and make sense of what lies beyond. (2001, para. 22)

He adds, "Most importantly, it is my view that the intelligence that will emerge will continue to represent the human civilization, which is already a human-machine civilization. This will be the next step in evolution, the next high level paradigm shift" (Kurzweil 2001, para. 23). Thus, despite recognizing the feasibility of menacing consequences, Kurzweil remains optimistic, or at least is more excited than frightened by what is expected to come, the same as most of the scientists interested in the Singularity.

Without entering the battle between "apocalyptic" and "integrated" regarding the consequences of technological development (paraphrasing Umberto Eco), what cannot be denied is that scientific and technological exponential advancement is on its way to reaching a significant peak. This probably will lead to a crossroads where humankind should face its own destiny, dealing with unknown and even unexpected consequences.

Future Scenarios

> "Any useful idea about the future should appear to be ridiculous"
> (Jim Dator)

Some key transforming elements regarded as relevant have been explicitly or implicitly mentioned across the preceding pages. For sure, many have not been

described or considered in the right way (according to their potential influence) or some others have been completely neglected, but this is just a humble and limited attempt to deal with uncertainty and to approach complexity for the exclusive purpose of reflecting on what comes next or, better said, on what (things) could come next.

As usual, while dealing with very complex and changing contexts, the range of possible futures is multiple—when non-infinite—since a slight mutation (a delay or bifurcation) in the further development of the observed variations of one driver may lead to very different scenarios. Suffice it to think in combinatory terms, simply taking into account the drivers considered: If unexpected contingent events occur—as usually happens in nature as well as in society—then the multiplicity of possible futures becomes endless.

Therefore, a clustering effort has to be made, since only reducing the range of possibilities will allow us to highlight manageable options for action; otherwise, the effort would be sterile. Building future scenarios consequently represents a permanent challenge where objective information meets subjective perceptions and values, and the required extrapolative analysis invariably merges with a creative and critical approach.

Three main scenarios for the future Internet have created using a sci-fi-like narrative, in accordance with the preliminary description and analysis and the author's subjective perception: *Die Übermensch* (the probable), *Digital Vortex as Violence* (the disruptive), and *Global Commune (*the preferable).

Die Übermensch

> "Man is something that shall be overcome …
> Man is a rope, tied between beast and overman—a rope over an abyss …
> What is great in man is that he is a bridge and not an end."
> (Friedrich Nietzsche, *Thus spoke Zarathustra*)

This is a go-with-the-flow scenario. No significant resistance to change exists on the path towards the merging of human and machine. Only a small percentage of the population, mainly well-educated elderly people (those who knew a world without the Internet) living in developed countries, shows a certain reluctance to having their life invaded by more sophisticated and invasive devices and applications. This segment, however, seems nearly testimonial in quantitative terms and is becoming even smaller, as those generations are gradually disappearing despite the increasingly high life expectancies. Digital natives living in developed countries do not show any kind of resistance whatsoever since, for them, living with continuous technological change forms part of their social DNA. Their attitude is based not only in the acceptance of the inexorable changes but also in the continuous expectation for the next thing to come, which eventually becomes the new quintessential exciting *raison d'être* of their life. A vast majority of the population, especially the young in developing countries, are also increasingly demanding technological

innovations and access under the promise of a better life: they consider that being part of cyberspace is the best way of escaping poverty by being connected to the emerging 'brave new world.'

Meanwhile, the Global Internet has become a total reality in 2030: now connection is possible across the whole planet, since even the most remote and inaccessible areas have balloon- and satellite-based Wi-Fi access for free; there is no place on Earth without access, even though speed ranges from 4 to 10 Gbps depending on the geographical area. Seventy-five percent of the population has personal portable devices, sometimes integrated into their own body: uniformity has not been achieved yet and, whereas most of the population still uses not-so-developed devices (even smart and portable), a wealthier élite can enjoy the option of *digital integration*: inserting cutting-edge digital devices under the skin to access cyberspace handless, and to manage and monitor all their biological, professional, social, and personal activities. This is a trend that will become a total reality by 2050, when digital integration will have become mandatory worldwide, and implants will be facilitated for free when a child is born, in the same way as vaccines are administered today (nanotechnology merging with biotechnology). Not being digitally integrated will be a crime and, therefore, prosecuted by law.

This happens in a political context where states progressively lose their functional role and assume a testimonial one, insofar as they are overwhelmed by the boundless and incontrollable nature of technological ubiquity. Because their role is essential both in the economy and in social life, large corporations start demanding to form part of the global government by joining the main political and economic supranational institutions. This is an unquestionable fact, since international law can hardly regulate cyberspace the way it used (or tried) to do, and companies have been influencing—if not controlling—social life de facto since 2020. Because cyberspace belongs to corporations and people (macro and micro levels), connecting them directly without the traditional intermediate role played by the state makes politics rise to a new dimension since public participation is now open to be direct, immediate, and continuous (24-7-365) but managed by the companies; in other words, the only role of politics consists in helping corporations manage social control—under a formal democratic legitimacy scheme.

The entirety of social life—all the interactions that shape economic relations, power management in politics, security balance, and the creation of cultural matters—is monitored by technological applications under predefined efficiency parameters in a kind of never-ending jigsaw puzzle where individuals are only pieces: nobody can choose his/her job, it is assigned (directly or not) to them; nobody chooses his/her love, it is assigned to them; nobody joins a group of interest, it is assigned to them; nobody chooses where to spend his/her holidays, they are assigned to them; and so on. Intelligent social networks and applications (which have proliferated, moving from influential tools to mandatory instructions) drive everybody's life. Free will no longer exists. Free will, the human ability to make choices without external control, ended de facto in 2030, and it will be completely abolished by 2050. Therefore, the whole human community is now represented by several billion nodes connected by the Internet. And this is the breathing part of a

larger network where everything is also integrated, from cars to planes, houses, computers, refrigerators, and databases. All machines make their own decisions according to what they consider the most efficient choice, from planes to cars, surgery systems, and freezers: they decide what you should eat today in accordance with your on-time biological test.

It is difficult to draw a distinction between real life and virtual life in 2030, since most human routines are managed/monitored through virtual means. People's daily life and personal identity are built from virtual databases. This distinction will have completely disappeared by 2050, but both dimensions still coexist in 2030. Physical actions are gradually replaced by virtual ones because cyberspace provides a 360° scenario to live in. First, computers become intelligent and interact with human beings, leading to a reality where virtual and real are mixed; then, and progressively, human life and consciousness move to the virtual space, thus affecting real interactions and experiences. By 2050, the human body is practically nothing but a container for the human brain. At this moment, total communication has come true, and cyberspace replaces real life, while the Internet becomes a neural network where everything and everybody is connected to a single entity. The human civilization as we know it has come to its end. The overman is born.

Digital Vortex as Violence

> "I can do anything I want. I'm a human being, not some god-damn robot"
>
> (John Connor in Terminator 3: Rise of the machines)

All the major processes described in the first scenario are valid here too, the only difference being that resistance to socially and technologically accelerated change increases from 2020, becoming radical in 2050. Not everybody resignedly—or enthusiastically—accepts the convergence of the real world with the virtual world. A growing part of the population—unsatisfied with the inexorability of technological progress and openly critical of it—decides to deny the possibility of following the rhythm of technological advance. Originally, it is less a Luddite reaction than an omniscience fatigue: it has nothing to do with destroying machines or forcing others not to use technology, but in denouncing the total invasion of both private and social life by cyberspace and vindicating the right to free will.

Think of a world where the Internet is everything: you are biologically monitored during your sleep (including your dreams); then, when you wake up and get out of bed, your fridge offers you exactly the food you need (calories, composition, and so forth) and the 3D screen in the living room shows you the sporting routine for today (that may vary depending on the contents of cumulative databases), while the intelligent system checks and manages your work and leisure agenda for the day (you need not remember anything or even think about alternative possibilities since the system itself manages everything in the most efficient possible way). Later on, you get in your car to travel to the city, but you do not drive it because that is the most

effective way to guarantee the absence of accidents: the smart car is connected to the network as well, and the system manages it automatically (it even knows where to go without you having to say anything)—the same as with all the other cars. In fact, human driving is still possible in 2030 but will be completely forbidden by 2050.

Marriages and divorces in this world are managed directly by the system (which tells you if somebody is good for your health, your happiness and your expectations; even if his/her dreams are compatible with yours). The same applies to work: you cannot choose where or when you work; it is the system that determines on a daily basis whether you are the right option in the database for doing something in the most efficient possible way. To do this, the system checks the jobs available for that particular day and the whole info about you; it draws a comparison with the rest of the options and makes a decision which is communicated to you early in the morning. And there is no need to own any kind of personal accumulated knowledge because the system can provide you with all the information required online (a software menu that can be downloaded into your brain automatically): any possible human behavior affecting health is forbidden, and participation in a triathlon has become compulsory for everybody since 2030, since what matters is to own a healthy body and mind that can assure a proper housing for the software. Being unhealthy is inefficient.

Even social life and leisure are driven by applications that filter (through an analysis of options and subsequent suggestions) and choose the ideal partner, activity, destination, accommodation, and trip for a rewarding experience, always within the parameters of health and efficiency.

The human ability to make emotional or rational choices (free will) in this alienating world has been practically erased—and so has improvisation—through the extensive use of digital commodities theoretically designed to make things easier, to achieve a better life. In 2030, twenty years after the appearance of the first smart devices and the definitive expansion of the Internet, and only 10 years since the arrival of the Internet of Things, it seems absolutely unthinkable—especially for the vast number of digital natives—not to live this way, not to be connected; not to be part, as a node, of cyberspace. Dependence is so high and increasing that human beings are gradually losing their natural skills to interact, to search for information, to carry out critical analysis, and to make decisions by themselves. Lack of access, if it ever happens, leads to episodes of anxiety and personality disorders.

However, as mentioned in the first paragraph above, the proliferation of the Internet of Things and the total ubiquity of cyberspace in 2020 starts to have a kind of boomerang effect upon a small part of the population, who begin to question the pace at which invasive devices, gadgets, and apps are delivered to them. Those rejecting *digital integration* for themselves and their descendants and advocating a more natural life, a minority at the beginning of this process, are now simply seen as freaky misfits. However, this problem of social acceptance, which implies being excluded from social life (as it basically happens in the virtual environment) soon results in major problems related to the economic sphere (work and business). Since *digital integration* becomes mandatory, this ultimately leads to an infringement of the law. These *dissidents* formally become delinquents in 2050: being connected

and monitored is no longer a matter of voluntary decision; it has become compulsory and justified under security terms. They cannot work, buy or rent a house, drive, travel, or even have children without being digitally integrated.

Such a situation results in the creation of hidden local communities worldwide in which an alternative way of life—based on a humanist perspective where free will appears as the key element—fights to survive apart from the system. There, open access technologies are created collectively under ethical restrictions in order to assure the preservation of human society, while traditional social structures and institutions (lost in translation in the digitalization process) can be recovered. A new model of society, parallel and alternative to cyberspace, is thus created in hidden rural areas, or even underground, to avoid prosecution. The system designates these communities as *terrorists*, though, and declares war on them.

In the end, the preeminence of digital logic over free will turns the original naïve rejection into a true revolt against the Internet of Everything, AI, biological implants, and all the other stuff that constitutes the system's backbone. A sort of rage-against-the-machine attitude flourishes on the basis of twentieth-century anti-system movements and gradually consolidates, while human life is becoming massively digital and intelligent computers and machines reach total control over life. The prosecuted local communities worldwide create their own communications network (an alternative to the Internet) in order to be organized so that they can eventually face a potential conflict with cyberspace and the system. These two worlds—one digital and one based on human bonds—end up clashing violently.

Global Commune

> "I alone cannot change the world, but I can
> cast a stone across the waters to create many ripples"
> (Mother Teresa)

By 2020, formal public structures and institutions start to put limits on their own dissolution through normative laws that create a new global legal framework that can control the digital world's insatiable and intrusive development. This means shaping a body of international legislation designed to handle the future Internet from a regulatory point of view, fitting and subordinating its further development to a shared value code based on the preservation of human rights—with freedom at the center. It is a coordinated way to approach technological innovation worldwide, which is joined by 100 % of the nation-states belonging to United Nations through a joint declaration signed by all its members in an official document.

Although it met objections coming from the big corporations operating in cutting-edge technology industries (Internet, virtual reality, AI, biotechnology, nanotechnology, etc.), this political initiative has come to form part of the international agenda due to a massive public demand for control. The aforesaid companies feel betrayed since they were born, stimulated, and developed under the umbrella of investment groups and holdings linked to national security agencies that have

fuelled such technological initiatives for decades and through massive investments, developing digital applications considered directly or tangentially interesting and with a large potential for surveillance and social control. From brain mapping to 3D holograms or intelligent computing, initiatives have been financed with public funds seeking to build a total network likely to be used for monitoring everybody and everything, all the time, and everywhere on the planet.

Although they have proved to be inefficient for years under free market competitive parameters, most of these companies survive thanks to the aforementioned unlimited investments meant to build a massive digital culture. The first rule for an effective surveillance tool is not to be perceived as such, but as an essential element to approach daily routines in a better way, naturally adopted and used through voluntary actions. And the best way to monitor people without generating political strain is to encourage to request to be monitored themselves by making apps and devices attractive enough to downplay their surveillance side. In an alienated and liquid world where consumption is the only way to reach success, where idols are built by the media, where people lack self-esteem and want it all here and now, where fast is better, it was just a question of time (and money) to find out systematic ways for people to deliver all their personal information for free in exchange for a minute of glory and global visibility. The digital world—as a fake deconstruction of social reality—made possible total control on a voluntary basis: there is no better way to manipulate individuals than by making them feel somehow important in the digital world (despite being irrelevant in the real world).

Nevertheless, by 2020, most people start to be fed up with such an intrusive Internet of Things, feeling uncomfortable with the increasing loss of control over their own life. People do not want to build their social life through social networks anymore because the impossibility of escaping (managing or deleting digital memory) scares them: the feeling that they are losing control over their own life becomes an extended fear. The same happens with every aspect of daily life: from choosing breakfast to driving or applying for a job. And it is the demand for a more human approach within the extensive use of cutting-edge technologies coming from civil society that drives the aforementioned political initiatives.

Thanks to these initiatives, a global legal framework is created that guarantees public control over the technological development of the future Internet—based on the public interest. Transparency and open access become the norm, giving priority to freedom without renouncing reasonable levels of security, reaching a kind of sustainable balance between both aspects.

The future Internet is then shaped in accordance with its original theoretical aim, which explained its own creation and massive acceptance: improving people's life in the sense of providing universal access to information, making it possible to create social communities of shared interests with a guarantee to ensure privacy, and the accessibility of knowledge, education, and work for people with difficulties (caused by disabilities or derived from being at the periphery of the system), and improving democracy through enhancement of participatory processes. The future Internet is consequently designed on a gradual basis as a global network of networks,

where cultural identities—even those of minorities—are respected and considered a strength, under a philosophy supported by the basic ideals of communal interest, diversity, free will, and humanism.

Epilogue

"There is more to life than increasing its speed."

(Mahatma Gandhi)

Not everybody at the beginning of the 1990s believed in the successful development of a then new and promising technology: the Internet. Clifford Stoll, an American astronomer, for instance, was truly skeptical about it (Stoll 1995). After only 20 years, it has been proven that the Internet has come to stay, and its development in the coming years can hardly be foreseen: We do not know if it will be for the better or for the worse (in the end, this is nothing but a value judgment), but what cannot be denied is that the Internet will play a key role in the articulation of future society. For those who—due to demographic and professional reasons—have had the opportunity to witness the formidable and unexpected extension of the Internet, it seems hard not to be pessimistic.

The Internet was merely a promising thing 20 years ago. For those, like me, who were involved in the process while simultaneously analyzing it as sociologists interested in technological advancement and social change, it was an exciting time indeed. Years earlier, Daniel Bell predicted the advent of the Post-industrial Society (in a generic way), and sociologists like Manuel Castells were exploring the enormous potential of what they called the 'Age of Information.' The Internet was supposed to have a large potential for reducing social inequality around the world through the provision of universal access to information and knowledge, and facilitating the formation of global networks (such as REEF) based on a common and shared interest for a creative purpose.

But the foreseeable development of the Internet has been quite different from what at least I (despite supposedly working on futures studies) could have imagined. For instance, and this is a mere anecdote, 90 % of the e-mail messages I receive in my folder every day—even though my server at the University uses anti-spam filters—are commercial, unauthorized messages. The problem is becoming worse and worse, since my e-mail account gets jammed every 3 or 4 days, and I am forced to waste some valuable time deleting spam. The same holds true about every application or website: the invasive nature of these developments is becoming a real nuisance, both professionally and personally. And this invasion is affecting even the role of human beings in this new emerging world: We no longer know whether the technology solves human needs or, on the contrary, it is the human being who adapts his or her life to technological change. The Internet is not what is supposed to be. It is not a tool for serving humans, but something frighteningly different.

Douglas Coupland, the artist, thinker, and author of the acclaimed book *Generation X*, wrote recently:

> We're not really built for permanent high-speed change—accelerated acceleration. So then, will there come a collective cracking point? And if so, what would a collective cracking point look like? It might not even be a collective political social gesture like a riot or a referendum. It might be that we all wake up one morning and realise we're not middle class or working class or anything … we basically just exist and the internet makes it bearable. (Coupland 2015, para. 5)

There should be more to life than increasing its speed, coming back to the quote of Gandhi that heads this epilogue.

To my mind, the progressive and massive commercialization of the Internet, supported by the proliferation of portable devices that facilitate online access, has perverted the Internet's original role. Additionally, in a short period of 15 years, the Internet has moved from a being a means to becoming an end in itself: The Internet was supposedly created 'for' something. Now that real life is being progressively transferred to the digital world, no justification is needed to explain the existence of the Internet: It simply exists on its own, and it is the 'place' where everything happens and everybody can meet everybody else. It is the cyberspace that real life is being moved to, step by step.

Therefore, what we have now is quite different from what was expected then. Instead of stimulating innovative synergies among users (as could be expected), the Internet mainly reproduces existing networks without any relevant contribution; instead of stimulating critical thinking, it largely reproduces standards; instead of fuelling creative and open participation, it is alienating society because it is not based on good communication and shared knowledge but purely on cheap opinion and 'noise.'

It was supposed to be a tool that would enable us to go one step beyond in the improvement of human civilization, but it is becoming a reproductive tool, basically oriented towards social control, surveillance, and marketing research. In the light of this reality, it seems hard to think of a better future to come, even if one is highly optimistic. I myself feel rather skeptical about people thinking what future they want instead of just letting themselves go, dazzled with such astonishing technological innovations. In my view, people are *still* happy, and they feel important for being part of cyberspace, whatever that means. Most individuals do not mind being monitored if they have the compensation of feeling important and integrated—even if that is not actually the case—and even if it is for a minute. After all, there are no underclasses, outsiders or losers in cyberspace: you can build your own profile at your own convenience there, choosing who you are in the eyes of others; you can continuously rebuild your own reality at your convenience. I must say it is the most terrific and effective tool for social control ever invented, amazingly brilliant.

All three scenarios described above share this certainly dystopian vision: the level of human strength (ranging from none to total) being the only difference between them. But this is what—in my opinion as a sociologist—will come next with the future Internet. It is the start of the liquid Self ('copying' Bauman): Individuals, as social beings, will increasingly become dissolved (their feelings,

thoughts, habits, fears, decisions, and so on) in cyberspace. The border between online and offline will inexorably become more and more blurred, until it finally disappears.

The ancient quote heading this writing was originally attributed to Plutarch (who quoted Pompey) and has been extensively used in different places and moments throughout history: from the Hanseatic League to the amazing Portuguese poet Fernando Pessoa, and to Brazilian singer Caetano Veloso (in his song 'The Argonauts'). Having the form of a sentence written on a boat, the title of a poem, or the meaning of a song, the message has always been the same: the existential vindication of transcendence in human beings, the convenience of experiencing life beyond mere physical existence, as the raison d'être for a living. The importance of dreams, challenges, experiences, and creativity; the importance of being connected with nature. The meaning of life.

But this quote may currently have an alternative ironic reading: most people are replacing living life by surfing in cyberspace, while being connected 24/7/365. The real thing does not matter at all; what really matters is being connected, living in a virtual construction, escaping from reality. Can this possibly become the essential and absolute way of living for human beings? Or, on the contrary, will people have the possibility to not to let their identity and free will be definitively dissolved in cyberspace?

The future Internet will ultimately be what individuals decide—whether by act or omission—because the future is in our hands and there is no predestination when we talk about technology. So, the future is open and has to be built by coming generations. As Anita Rubin wrote, children are ready for the future.

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Chapter 13
Conclusion: Three Stages of the Future Internet

Ryota Ono and Jenifer Winter

In this book, a diverse group of futures researchers have explored alternative visions of the future Internet, highlighting key uncertainties that are not well addressed in the current discourse about technology and policy developments. Corporate, academic, and policy visions associated with the future Internet present a techno-utopian view, focusing on the integration of myriad computational objects into the everyday environment in order to enable economic growth, strengthen security, enhance business and government efficiency, and promote environmental sustainability and personal convenience. Contributors to this volume probed the underlying values, beliefs, and thinking that are influencing these futures, and presented a compelling array of alternative visions about the future Internet.

The Value of Futures Scenarios

As Chap. 1 elaborates, futures studies is an academic discipline that helps us to examine uncertainty about the future. Inayatullah (2002a, b, 2004) discusses three different approaches used in futures studies: *predictive* (empirical), *cultural* (interpretive), and *critical* (poststructural). Each approach has different assumptions about present reality and the future. The predictive approach considers how we can develop forecasts of the future by analyzing complex interactions among key trends and events. The cultural approach does not seek to predict outcomes but offers insight into the future by examining how different groups envision their present

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reality as well as future possibilities. This helps us to understand that both present and future images are culture-bound. The critical approach regards the present as a product of those in power, and shows that particular futures are created and promoted to serve their interests. The goals of the critical approach are to disturb present power relations and to make the present less rigid by identifying and challenging the assumptions underlying the present and dominant images of the future. The critical approach investigates how a particular problem is framed to privilege one view over others. Central to the cultural and critical approaches is the notion of *civilizational futures research*. Civilizational futures research makes current categories (i.e., ways of conceptualizing the world that we take for granted) problematic, since they are often based on the dominant civilization. These two approaches inform us that behind the level of empirical reality is *cultural reality* (reflections on the empirical) and behind that is a *worldview* (unconscious assumptions on the nature of the real) (Inayatullah 2002b). All contributors to this book have incorporated both the cultural and the critical approaches into their research about the future Internet.

Examining alternative scenarios helps us to better understand how certain trends and events might work interactively to shape the future. Such an understanding fosters development of a new epistemological framework, which guides us to observe developments as they unfold in the future and to reflect more deeply on their meaning (Heijden 1996). This new futures-oriented framework is more holistic than those developed in other disciplines, as others typically focus on extracting certainty from uncertainty. In contrast, futures studies understands that the future(s) is, by its very nature, uncertain. The greatest benefit of alternative futures scenarios is that they open our eyes to a wide range of uncertainties in the future, allowing us to identify and test assumptions, and respond to challenges more creatively. It is critical that we learn to see the future not as a compilation of randomly occurring trends and events, but as a coherent system in which these trends and events interact with one another (Heijden et al. 2002). The success of an alternative futures scenario depends upon how holistically and comprehensively the reader comes to understand possibilities for the future (Heijden 1996).

Macroanalysis of Alternative Scenarios for the Future Internet

In this concluding chapter, we perform a macroanalysis of the scenarios presented in the preceding chapters from predictive, cultural, and critical futures studies perspectives.

Predictive Perspective

First, we extract predictive aspects from the scenarios in this volume. Figure 13.1 depicts a map of the relationships between the Internet and three key stakeholders: citizens, states, and corporations.

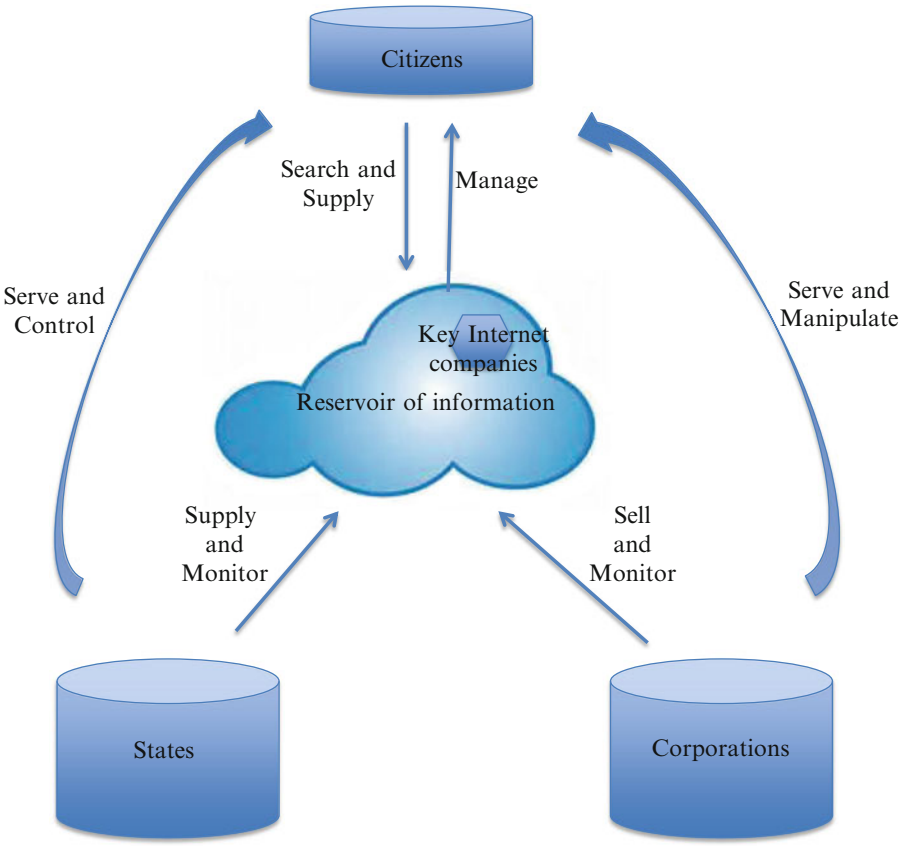

Fig. 13.1 The Internet as a reservoir of information

From the predictive perspective, it is argued that the condition of the present and near-term future of the Internet might be described as a "reservoir of information." Citizens used to employ the Internet to search for certain information, often locating it free of charge (aside from any connection costs). Key Internet companies such as Yahoo and Google laid out the basis of such a business model on the Internet in the late 1990s. As the number of Internet users increased, Internet companies began to realize the potential capitalization of the information that users leave behind as they traverse the Internet. As such, the Internet has become an important reservoir of information. Nowadays, most citizens are aware that they cannot help but leave information about themselves on the Internet through a variety of daily activities. As the types and quantity of data collected increase, the "reservoir" gets filled with an extensive variety of information, and the intelligence of computers that underlie the Internet is advancing rapidly—some believe that it will soon surpass human intelligence. Gradually, the degree of citizens' dependence on the Internet has

increased and, as a result, we are getting *managed* by the Internet. Concepts discussed in futures scenarios, such as "safety Net," "increased Internet dependence," "a digital meanings society," "infectious connectivity," "split Internet," "autonomously governed communities," "noosphere," "IoT," and "IoE," indicate variations of these relationships between citizens and the Internet.

States and corporations have not missed the opportunity to take advantage of this reservoir of information, as the Internet enables the recording and storage of countless communications and transactions. States are eager to know as much as possible about their citizens, especially about their political attitudes and economic conditions. The 9/11 events in the USA in 2001 made the world realize that a terrorist attack could take place anywhere and at any time. This fear led to states passing legislation to authorize collection and analysis of personal information, ostensibly so that states can prevent the next terrorist act from happening. States, of course, continue to supply useful information for citizens on the Internet. Increasingly, however, they are busy monitoring the information that citizens and corporations gathered during their use of the Internet—things like location data, metadata from phone calls, and relationships gleaned through social media use. States seek to expand their control over citizens, a possibility discussed in the scenarios under concepts such as "surveillance" and "no right to refuse." The possible reactions of those who refuse the increasing control of the state are also described in a few scenarios.

Since the US government decided to let corporations use the Internet for commercial purposes, a variety of business models have emerged in the virtual market of the Internet. At first, corporations were busy selling their products and services on and through the Internet. Gradually, however, they have become more effective at selling their products to choice segments of the Internet market, basing these choices on analytics that exploit the data recorded and stored on the Internet. Corporations continuously monitor the "reservoir of information" and use the necessary information not only to predict customers' buying habits but also to manipulate them to buy their products.

In the present, as well as in some futures scenarios, the status of citizens in the reservoir of information (as represented by the relative heights of the cylindrical objects in Fig. 13.1) is the lowest. A number of scenarios discuss possibilities related to these relationships among citizens, states, and corporations.

Cultural Perspective

Futures scenarios can also demonstrate the cultural aspect of futures studies. As Inayatullah (2002b) observes:

> Through comparison, through examining different national or gender or ethnic images of the future, we gain insight into the human condition … Learning from each model – in the context of the search for universal narratives that can ensure basic human values – is the central mission for this epistemological approach. (p. 8)

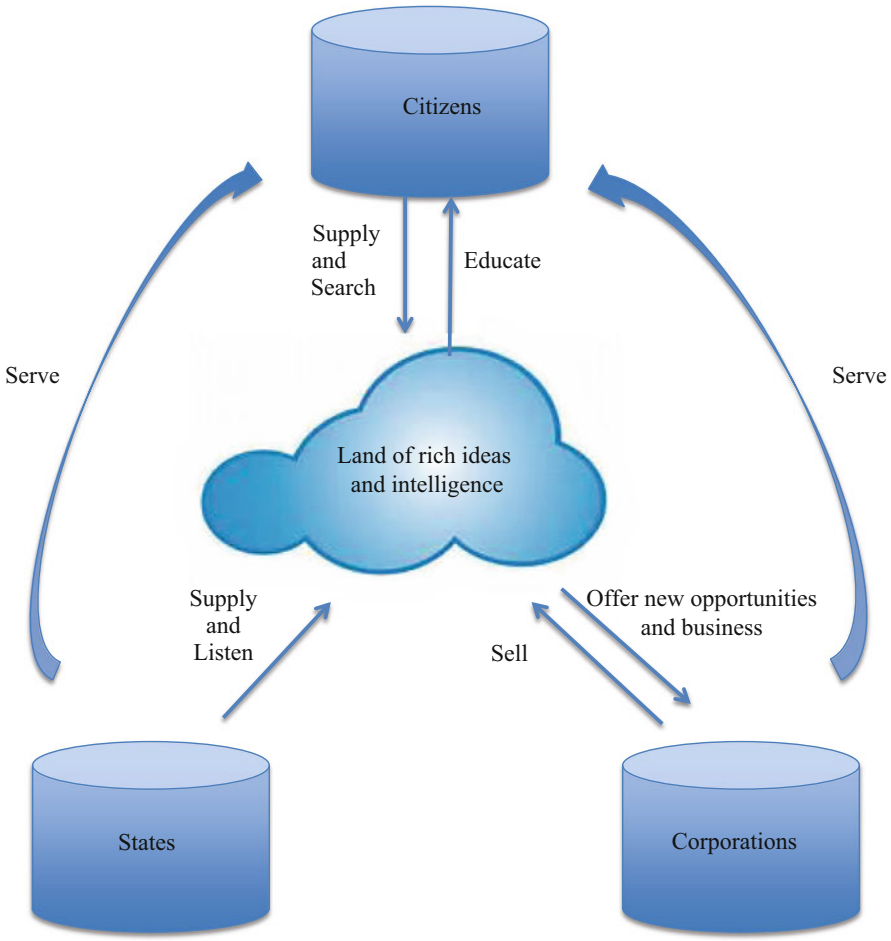

Fig. 13.2 The Internet as a land of rich ideas and intelligence

Figure 13.2 shows a future map of the Internet in which the cultural role of the Internet is depicted as a "land of rich ideas and intelligence." Some scenarios depict citizens exerting a more significant influence on development of society and, as a result, they begin to actualize untapped potential. These scenarios regard the Internet not as a technology into which humans are assimilated but as the source of political and social innovation. Concepts such as "liquid democracy," "collective intelligence," and "disappearance of various boundaries" are possible stories on this map.

The culture of mechanical information retrieval and secretive monitoring is replaced by a new culture of reciprocal communication with conscience. The basic tenet in these images of the future is that humans are more willing to work together and more capable than they believe. Citizens are more actively engaged in generating, as well as learning from, knowledge and wisdom on the Internet. Instead of

allowing the Internet to manage and shape their behaviors, they find ways to augment themselves in a human-centered way, without sacrificing identity or autonomy. Both states and corporations benefit from the knowledge and wisdom of citizens, and they focus on serving them in return.

From this perspective, the status of citizens in the "land of rich ideas and intelligence" is more balanced with that of corporations and states. Some of the scenarios reflect these potential shifts in power dynamics.

Critical Perspective

The critical perspective helps us to pay attention to a variety of implications of power imbalances among key stakeholders, including not only majorities but also minorities. This perspective argues that the present condition is the product of unbalanced power relationships and that very different conditions could emerge in the future. According to the predictive and cultural perspectives, citizens, states, and corporations are key stakeholders, and the Internet mediates their relationships. Most work, operations, and learning take place through the Internet. The critical perspective leads us to question such a relationship (i.e., the existing condition) and to imagine different scenarios. Figure 13.3 represents a synthetic image of preferable scenarios in the preceding chapters.

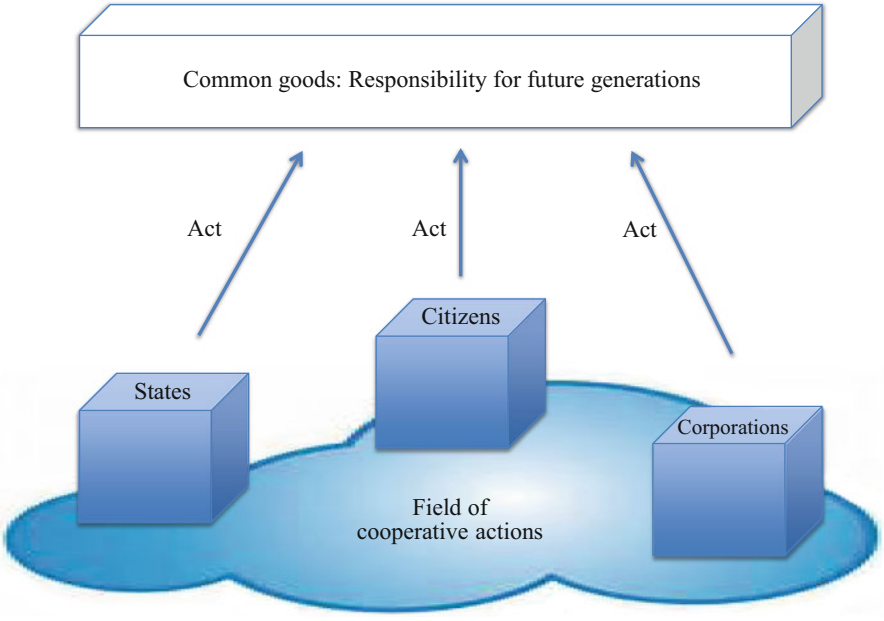

Fig. 13.3 The Internet as a field of cooperative actions

Some of the authors' preferred scenarios argue for a "Gaia of civilizations," "political culture of deep engagement," or "collaborative practices." Those scenarios aim at achieving something significant for society and humanity: the *continuing proliferation of human civilization* (see Tough 1991). Given that the history and the future of the Internet will be too short to be remembered even ten generations ahead, it is argued that technologies like the Internet, which possess great potential, should not be placed at the center of society but made use of as a powerful base upon which humans can face global and local challenges and carry civilization towards more mutually desirable futures. In such an image, the future Internet is described as a "field of cooperative actions." And by acting together on such a field, humans might be able to find a better understanding of the meaning of our lives on Earth.

Image of the Future Internet

Polak (1973) argues that a positive image of the future always precedes a positive, real development in that society. Bell (1997) presents an example of this causal relationship between an image of the future and its consequence in the future. The Allensbach Institute in the former West Germany has interviewed a representative sample of 2000 people every December since 1949. One of the questions in the interview schedule asks, "Is it with hopes or with fears that you enter the coming year?" (p. 247). It was found that there had been a striking causal relationship between people's mood towards the next year and the real growth of the GNP. That is, people's anticipation in a certain year has been a strong predictor of the change in economic conditions in the following year. What this finding indicates is that past developments are not necessarily predictors of the future, whereas an image of the future indicates more accurately what kinds of development might be unfolding over time.

Rubin (1998) emphasizes the power of images of the future in perceiving "large and complex wholes" (p. 499). Reflecting on images of the future encourages holistic thinking about problems, and leads us to reflect on institutional contexts and various sociotechnical elements. As we become increasingly comfortable with complexity and the idea that there is no single, right answer, or "right" future, exploring images of the future can hone our analytical ability to locate key driving forces and uncertainties and learn to imagine multiple, alternative possibilities. Masini (2001) has noted that citizens are empowered by becoming aware of the many changes occurring around us and argues that a futures-oriented and interdisciplinary perspective is needed to "empower analysis and actually reflect society in its continuous dynamicity" (p. 637). By stimulating our creative and critical thinking processes, we can improve decision making in the present.

Although present circumstances do constrain the development of future events, the future *can* be influenced by human action. "Even coming events beyond human control can be adapted to successfully if they can be anticipated" (Bell 1996, p. 13). The goal of considering the future carefully and thoroughly is neither to satisfy our

curiosity nor to predict the future accurately. Rather, it is to help us to gain insight into possible futures *in order to make better decisions in the present* (Bell 1997; Dator 1996). A common practice in planning is to examine both the present and the immediate future and determine what actions we must take to fulfill our immediate needs (Tough 1991). What is missing in this process is a careful consideration of the other consequences of taking these actions. Due to multiple interrelationships and contingencies, a decision pursuing just an immediate benefit will very often affect other system elements in the long-term future. It is hoped that the research on the future Internet in this book, using a futures approach and focusing on a long-term view, will help all stakeholders make truly "better" decisions about the future.

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