Public Administration and Information Technology 9

Saqib Saeed *Editor*

User-Centric Technology Design for Nonprofit and Civic Engagements

Springer

Public Administration and Information Technology

Volume 6

Series Editor

Christopher G. Reddick, San Antonio, TX, USA

For further volumes:
http://www.springer.com/series/10796

Saqib Saeed
Editor

User-Centric Technology Design for Nonprofit and Civic Engagements

Springer

Editor
Saqib Saeed
Department of Computer Science
Bahria University
Islamabad, Pakistan

ISBN 978-3-319-05962-4 ISBN 978-3-319-05963-1 (eBook)
DOI 10.1007/978-3-319-05963-1
Springer Cham Heidelberg New York Dordrecht London

Library of Congress Control Number: 2014936631

Printed on acid-free paper

Springer is part of Springer Science+Business Media (www.springer.com)

To
My Sweet Daughters
Rameen and Eshaal

Preface

Recently nonprofit organizations have got more attention of general public as state institutions are moving away from their responsibilities towards citizens. In order to indulge in effective work, such social settings are needed to communicate and coordinate effectively. As a matter of fact, such nonprofit organizations are typically characterized by lack of resources, absence of formal hierarchical structures, and differences in languages and cultures among the activists. Modern technologies can help nonprofit organizations in improving their working. Technology support for nonprofit sector is an important field of research not only due to the increased political importance of this sector in a globalized world but also due to their organizational characteristics. In order to design appropriate technological support for such settings, it is important to first understand their work practices which widely differ from traditional business organizations. This book "User-Centric Technology Design for Nonprofit and Civic Engagements" aims to strengthen the body of knowledge by providing user studies and concepts related to user-centered technology design process for nonprofit settings.

The aim of the book is to present high quality contributions examining the inherent issues, technology design implications, user experiences, and guidelines for technology appropriation in nonprofit settings. The key objectives of the book include:

- Capturing the state of the art in technology design for nonprofit and civic settings
- Presenting relevant theoretical frameworks and practical approaches prevailing to current and future research
- Providing best practices for fostering technology in nonprofit and civic settings

The book focuses on theory and practice in a balanced way. It is organized into two parts and each part contains six chapters. The contributions in the first part discuss conceptual foundations for the technology support in nonprofit sector whereas the contributions in the second part of the book discuss different case studies. The book will be of interest to academics from a range of fields including Information

Systems, Human Computer Interaction, Computer Supported Cooperative Work and Organizational Science as well as for government officials and governmental organizations. This book will also be helpful for students who want to learn about the design of information systems in the context of nonprofit settings from a user-centric perspective.

Islamabad, Pakistan Saqib Saeed

About the Editor

Dr. Saqib Saeed is an assistant professor at the Computer Science department at Bahria University, Islamabad, Pakistan. He has a Ph.D. in Information Systems from the University of Siegen, Germany, and a Master's degree in Software Technology from Stuttgart University of Applied Sciences, Germany.

Dr. Saeed is also a certified software quality engineer from the American Society for Quality. He is a member of advisory boards of several international journals besides being guest editor of several special issues. Dr. Saeed's research interests lie in the areas of human-centered computing, computer supported cooperative work, empirical software engineering, and ICT4D and he has more than 50 publications to his credit.

Contents

Part I Theoretical Foundations

1 A Case for Philanthropic Informatics 3
Amy Voida

2 Understanding Internet Use in Grassroots Campaigns: Internet and Social Movement Theory 15
Lasse Berntzen, Marius Rohde-Johannessen, and James Godbolt

3 The Impact of the Internet on Global Networks: A Perspective 25
Shefali Virkar

4 Ensuring Participatory Design Through Free, Prior and Informed Consent: A Tale of Indigenous Knowledge Management System 41
Tariq Zaman and Alvin Yeo Wee

5 Social Website Technologies and Their Impact on Society 55
Saeed Alshahrani and Rupert Ward

6 Improving Visibility of Humanitarian Supply Chains Through Web-Based Collaboration 69
Mohammad Anwar Rahman

Part II Case Studies

7 Exploring Civic Engagement on Public Displays 91
Simo Hosio, Jorge Goncalves, Vassilis Kostakos, and Jukka Riekki

8 An Implementation of isiXhosa Text-to-Speech Modules to Support e-Services in Marginalized Rural Areas 113
Okuthe P. Kogeda, Siphe Mhlana, Thinyane Mamello, and Thomas Olwal

9 Information and Communication Technology Platform Design for Public Administration Reform: Tensions and Synergies in Bangalore, India 135
Shefali Virkar

10 Context-Aware Mobile Interface Design for M-government 171
Hana Al-Nuaim

11 Understanding Web Usability Issues: A Case Study of Pakistani Political Parties 187
Tayyaba Ayub, Kiran Nazeer, and Saqib Saeed

12 Kenyan eParticipation Ecologies and the Rise of African Techno-Discourses: Methodological and Ethical Challenges in Understanding the Role of ICTs in Kenya 195
Vincenzo Cavallo

Part I
Theoretical Foundations

Chapter 1
A Case for Philanthropic Informatics

Amy Voida

1 Introduction

Questions about the continued relevance of the nonprofit sector have piqued our cultural interests, seeping out of the purely academic discourse and into the popular media. In a recent book aimed at the popular press, new media scholar Clay Shirky has argued that new technologies enable people to organize themselves without the formal structures of traditional organizations (2008). And even more provocatively, he contends that "now that there is competition to traditional institutional forms for getting things done … their purchase on modern life will weaken as novel alternatives for group action arise." A recent New Yorker article by Malcolm Gladwell pushed back at this assertion, drawing from an extensive body of social movement research which demonstrates the myriad ways organizations provide key infrastructures that are crucial for achieving large-scale social impact (Gladwell 2010; see also McAdam and Scott 2005).

This debate, while perhaps fruitful for drawing broader attention to the importance of research in this area, largely misses the point, focusing on a coarse distinction about what does or does not constitute an organization as opposed to asking how information and communication technologies might better serve all philanthropic efforts toward the common good. For the reality is that nonprofit organizations have a history of being shapeshifters, adjusting their own work to adapt to changes in the social and economic context (Voida 2011; see also Til 1994). Moving forward, nonprofit organizations will need to adapt to changes in the technical context, as well. Researchers studying the public's grassroots use of technology in times of crisis, for example, have observed that organizations need to adapt, in

A. Voida (✉)
School of Informatics and Computing & Lilly Family School of Philanthropy,
Indiana University, IUPUI, 420 University Blvd., Indianapolis, IN 46202, USA
e-mail: amyvoida@iupui.edu

S. Saeed (ed.), *User-Centric Technology Design for Nonprofit and Civic Engagements*,
Public Administration and Information Technology 6, DOI 10.1007/978-3-319-05963-1_1,

particular, to leverage the public's "emergent, improvisational, and innovative technology use" (Palen and Liu 2007). While this may be a tall order, it is not one that is beyond the pale for nonprofit organizations. One might certainly engage in productive research to help nonprofits adapt to the constantly changing ecology of technologies—to improve their information management systems (e.g., Voida et al. 2011), engage in digital fundraising (e.g., Goecks et al. 2008), or connect with advocates and volunteers via social media (e.g., Voida et al. 2012).

But to stop there would be to diminish the legacy of shapeshifting within the nonprofit sector and to ignore the deeply rooted interactions and interdependencies among technology and our cultural institutions. Philanthropic activity transcends organizational boundaries, if such things exist. And organizations, themselves, are changing in ways that fundamentally defy our traditional understanding of organizational structure and genre.

In this chapter, then, I argue that a focus on the design of information technologies for nonprofit organizations, or any institutional form for that matter, is too narrow a focus to support the full breadth of philanthropic activity and the full diversity of stakeholders in this domain. Instead, I challenge the research community to take up a more holistic unit of analysis, one that engages in the study and design of information and communication technologies to support any philanthropic work that is being done, in whatever context or contexts that might be. Here, I present a case for philanthropic informatics.

2 Nonprofit Organizations Are Shapeshifters

Historically, nonprofit organizations have functioned as shapeshifters, filling the gaps between other sectors and offering goods and services that are underprovided by other organizations and institutions (Voida 2011; see also Til 1994). So as the context surrounding nonprofit organizations has changed, the work of nonprofit organizations has changed, as well. In general, then, there has not been one static instantiation that we can point to and say, "That is and will always be the nonprofit organization." This continues to be the case.

In the United States, a federal social services program exists to help provide nutrition assistance to low-income households.[1] The program, called the Supplemental Nutrition Assistance Program (SNAP), is beneficial not just to the low-income households who are often suffering from food insecurity; the positive impact of the program also extends into local communities, as the federal monies behind SNAP are spent almost immediately at local stores and spur economic growth within the local community (Zandi 2008). It is in the best interest of many, then, to help ensure that eligible individuals and households are enrolled in this program. The state of California has the lowest rate of participation of any state in SNAP (Cunnyngham et al. 2013), and there are a number of efforts aimed at increasing

[1] http://www.fns.usda.gov/snap

participation. One of these efforts is the deployment of an e-government system—Benefits CalWIN—that allows individuals and households to apply online for supplemental nutrition assistance.

I have been part of an ongoing research collaboration, studying the deployment of this e-government system within one county in Southern California. We have carried out fieldwork with the social services office that is responsible for processing all of the online applications. Data collection at this field site began in May 2011 when one researcher interviewed a social services administrator who oversees more than 1,400 staff members distributed among seven different offices. This interview lasted 90 min and provided a high-level orientation to the social services organization and their deployment of the e-government system, Benefits CalWIN. Eight months after that initial interview, in January 2012, another social services administrator organized a 3-day visit. During that visit, the same researcher interviewed 11 additional social services workers for 1 h each. The 11 additional interviewees represented five different positions in the organizational hierarchy, from the on-site manager who directs the center to supervisors in middle management positions and eligibility technicians who process the social services applications and determine eligibility. We also interviewed an administrator responsible for implementing social services policy mandates within the county.

Because of the fixed and intensive period of interviews, all data analysis occurred after data collection. We conducted our data analysis iteratively and inductively using open coding, memoing, and affinity diagramming techniques (e.g., Corbin and Strauss 2008). This fieldwork has foregrounded the ways that the values of the social services workers conflict with the values that are embodied in the e-government system (Voida et al. in press). We found that these conflicts caused misunderstandings and communication delays between clients and social services workers, caused additional administrative overhead for both the clients and the social services workers, impeded access to the service for clients, and raised questions about the potential for clients enrolled via the online system to become long-term self-advocates in the program.

Yet this particular institutional focus is only one facet of our research. Indeed, if it were the only institutional focus, we would have missed out on some of the most compelling insights and research opportunities in this area. The deployment of Benefits CalWIN corresponded with a sharp downturn in the US and international economies. During economic downturns, the need for food and nutrition assistance typically increases, while federal and state funding to support social services operations tends to decrease. In these situations, it is often the nonprofit sector that steps up to help fill the gap between available services and local needs.

In this Southern California county, local nonprofit organizations with a vested interest in fostering food security were given grants to help step up—to become advocates for social services programs within their communities and to assist clients in applying for supplemental nutrition assistance. The employees hired with this grant money and tasked with this responsibility were outreach workers.

So in addition to carrying out fieldwork at the social services office, we also carried out fieldwork with outreach workers and their colleagues at three nonprofit organizations. Over a 7-month period, we carried out approximately 49 h

of observation of 9 outreach workers at 15 community outreach locations. We conducted 20 semi-structured interviews with individuals working in three nonprofit organizations, including all 10 outreach workers in this county, 3 outreach work supervisors, and 7 other workers within the outreach organizations (e.g., staff in charge of social media, IT support, and other assistive programs). We interleaved data collection and analysis, which was conducted iteratively and inductively using coding, memoing, and affinity diagramming (Charmaz 2006).

Outreach workers embody the shapeshifting nature of nonprofit organizations, and their work reveals some of the challenges inherent in functioning as intermediaries in the fluctuating space between institutions and sectors (Dombrowski et al. 2012; Dombrowski et al. 2014):

- Outreach workers mediate between clients' misconceptions about social services programs and the official program rules and regulations.
- Outreach workers foster bureaucratic literacy, education, and empowerment so that clients can function as self-advocates within the social services program.
- Outreach workers believe they are evaluated by clients based on their knowledge of a program with which they are not formally affiliated (i.e., they are often mistaken for social services workers, which they are not, and assumed to have knowledge about the state of an application, to which they are not privy).
- Outreach workers believe they are evaluated by clients based on their expertise using a system, Benefits CalWIN, over which they have no control. When the system breaks down, it undermines their hard-won rapport with clients. In response, outreach workers have adopted supplemental technologies as workarounds (e.g., using their cell phones as mobile hot spots to counter inconsistent Wi-Fi access or using a scanner to scan client documents so that they can take the information back to their office and input it into the system under more favorable technical conditions).

This research exemplifies the shapeshifting nature of nonprofit organizations. Just as, historically, nonprofits have adapted their work practices to the evolving social and economic context, they shapeshift, as well, to adapt to the evolving technical context. In this case, they have stepped up to serve as intermediaries with an e-government system in support of the larger goal of reducing food insecurity within their communities. These nonprofit organizations have shapeshifted both in terms of the services they provide and in terms of how they provide those services.

From a methodological perspective, then, research in philanthropic informatics necessitates an ecosystem perspective, understanding not just the institutions in which the philanthropic work and technology interventions originate, but exploring the interrelationships and interdependencies between institutions, as well. This type of a perspective is essential for understanding the experiences of a breadth of stakeholders, and it broadens our understanding of who may influence and be influenced by the philanthropic work we study. Further, an ecosystem perspective allows us to uncover sites where essential philanthropic activity is occurring largely invisibly, in the taken-for-granted infrastructures of our communities and cultural institutions (see, e.g., Dombrowski et al. 2012).

3 Nonprofit Organizations Have Ill-Defined Boundaries

Nonprofit organizations, particularly charitable or volunteer-driven NPOs, have a long history of having ill-defined boundaries. These organizations have been sites of key partnerships with the public since the late nineteenth century (Hall 1994; Til 1994). They frequently rely on members of the public to contribute both time and money toward organizational goals—to increase their quality of service, to reach out to new clientele, to engage in community outreach and education, and to influence policy decisions (Brudney 1994). Volunteers working with nonprofits are a significant resource to the workforce. In the United States[2], for example, approximately 64.5 million people (~26.5 % of the US population) volunteered for a nonprofit organization last year, with a median of 50 h worked annually per volunteer (Bureau of Labor Statistics 2012). NPOs also frequently rely on members of the public to contribute financially to their work. In 2012, individuals and institutions in the United States donated a combined $316 billion to nonprofit organizations; individual donations accounted for 72 % of this total (Giving USA 2013). Without these kinds of partnerships with the public, NPOs would be hard-pressed to do the work that they do.

From a research perspective, then, where does one draw the boundary around an institution like an NPO that relies so fundamentally on members of the public for its work? Are volunteers, donors, and advocates a formal part of the organization? If an advocate retweets an organization's tweet, is that work being done within the boundaries of the organization? If an employee of the organization uses a personal social media account to conduct her work, is that work still being done within the boundaries of the organization?

As part of another collaboration, I have conducted fieldwork with volunteer coordinators at a variety of nonprofit organizations. We recruited 23 participants (22 female), all of whom were responsible for managing the volunteers in their nonprofit organizations. We recruited participants in three different metropolitan areas in the Western United States, primarily via snowball sampling, and we continued recruiting participants until we had achieved data saturation regarding both the use and nonuse of technology as well as sampling breadth along two dimensions: the size of the volunteer program and the domain of the nonprofit. Participants represented volunteer programs along a continuum from those just starting to recruit volunteers to those managing established programs with ~2,300 volunteers. Participants also represented seven of nine major classes of nonprofits, including arts, education, environment, health, human services, foreign affairs, and public benefit (e.g., community service clubs) (National Center for Charitable Statistics 1999).

[2] I motivate this argument with statistics detailing the interdependence of the US nonprofit sector because it is larger, by percentage of GDP, than that of any other country (O'Neill 2002). However, many other countries also have thriving and important nonprofit sectors (Salamon and Sokolowski 2004).

We conducted semi-structured interviews using a protocol designed around the following areas of interest:

- The background of the organization and its mission and the ways that the interviewee believed her work and the work of the volunteers contributed to this mission.
- The nature of the work undertaken by the interviewee, with an emphasis on coordination work both within and outside of the organization.
- The role of digital and analog technologies in her work.

Interviews lasted 60 min, on average. We interleaved data collection and data analysis, which was done iteratively and inductively using grounded theoretical methods (Corbin and Strauss 2008).

We identified two broad classes of technology in our initial analysis, each associated with a distinct set of issues and challenges for the field of human–computer interaction. The first class of technology included databases and personal information management tools (e.g., Microsoft Outlook and Excel) that had been appropriated for organizational use (Voida et al. 2011). The second class of technology included a variety of social computing technologies—both those that are marketed to the general public and appropriated by volunteer coordinators (e.g., Facebook and Twitter) as well as third-party social computing applications that have been developed specifically for nonprofits and volunteer coordination (e.g., VolunteerMatch) (Voida et al. 2012).

This fieldwork foregrounds the thorny nature of organizational boundaries. Operating under significant resource constraints, volunteer coordinators struggle to manage the breadth of information that is essential both for conducting the day-to-day operations of their volunteer programs and for analyzing and reflecting on the scope and impact of the volunteers within the organization (Voida et al. 2011). In general, volunteer coordinators craft assemblages of paper-based tools, spreadsheets, and address books in an attempt to satisfice their information management needs. Databases are often seen as an impractical solution because of the overhead it would take to set one up, migrate data into the system, and maintain it over the long term. A number of participants had used custom databases; however, in most of these instances, the volunteer coordinators had recruited volunteers with expertise in information technology to help set up their databases. Yet, when these IT experts no longer had time to volunteer, the databases were frequently abandoned. So to what extent are these volunteers working within the boundaries of the organization? Under what circumstances? Just while they are in the building, working on the database? What about when they run out of time for volunteering but still possess critical organizational knowledge? Are they still part of the organization then? The same questions arise for advocates and donors. To what extent and under what conditions does their philanthropic activity fall within the boundaries of the nonprofit organization?

Many volunteer coordinators in this same study reported that a single point person in their organization managed the “official” organizational social media account (Voida et al. 2012). Because these volunteer coordinators did not always

have easy and direct access to the organization's social media accounts, many of them used their personal social media accounts to recruit volunteers and to advertise events and opportunities that were being hosted by their organization. When an organization's employees use personal accounts in social media, is that philanthropic work within the boundaries of the organization? If so, does that make a third-party, public social media service like Facebook or Twitter an organizational information system?

Because of the extraordinary collaboration between organizations and the public and because of the increasing use of public social media by organizations, providing a useful delineation of the boundaries around nonprofit organizations is becoming increasingly difficult. From a philanthropic informatics perspective, the boundaries around an organization are of less utility than the boundaries around the philanthropic work being done. Indeed, it may be that the ill-defined organizational boundaries, themselves, are key to many of the compelling research questions in this space, for example:

- How can technology be designed to support the fluid involvement and multifaceted identities (e.g., Brewer and Gardner 1996; Farnham and Churchill 2011) of the stakeholders in this domain?
- How can technology be designed to support the distributed facework (e.g., Goffman 1959) implicated in philanthropic activities?

4 Organizational Genres Are Increasingly Blurred

Scholars in several fields are calling into question the traditional distinctions between various organizational genres and the divisions of scholarship about each genre. The field of political science, for example, has traditionally distinguished among three genres of organizations: political parties, interest groups, and social movements (Chadwick 2007). Each genre of organization is associated with a set of repertoires, "a limited set of routines that are learned, shared and acted out through a relatively deliberate process of choice" (Tilly 1995). Political parties, for example, use repertoires that comply with parliamentary rules and adhere to hierarchical organizational structures; interest groups use repertoires that comply with lobbying laws and typically do *not* require mass mobilization; and social movements use repertoires characterized by experimentalism and *do* rely on mass mobilization (Chadwick 2007). These repertoires are significant embodiments of organizational culture:

> Repertoires play a role in sustaining collective identity. They are not simply neutral tools to be adopted at will, but come to shape what it *means* to be a participant in a political organization. Values shape repertoires of collective action, which in turn shape the kind of adoption of organizational forms. (Chadwick 2007, p. 285)

Yet new, more hybrid organizational forms now challenge these traditional distinctions, blending repertoires from multiple organizational genres and even

switching from one set of repertoires to another (Chadwick 2007). Chadwick references the nonprofit organization MoveOn as an exemplar of this phenomenon. MoveOn began as a small website in 1998; it hosted an online petition requesting the US Congress to set aside an extended, partisan debate over a single issue and "move on" to more important issues. Once that debate had waned, MoveOn adopted a new set of repertoires and functioned for several years as an antiwar movement. But by 2003, MoveOn had adopted yet another set of repertoires, acting as lobby group in opposition to proposed changes to rules governing the Federal Communications Commission. The same year, MoveOn hosted an unofficial Democratic primary, a repertoire associated with political parties, another organizational genre, entirely.

The methodological implications of making strong academic distinctions based on organizational genre can be seen more clearly in the division between studies of organizations and studies of collective action. Despite both being studies of forms of "coordinated collective action" (Campbell 2005), the fields of organizational studies (OS) and social movement analysis (SM) have taken largely divergent analytic paths (Clemens 2005; McAdam and Scott 2005). In general, where OS focuses on organizations (the structure), SM focuses on organizing (the processes); where OS focuses on established organizations, SM focuses on emergent ones; where OS focuses its unit of analysis on fields of related organizations, SM focuses its unit of analysis on a particular movement; where OS focuses on power in terms of institutionalized or "prescribed" politics, SM focuses on power in terms of marginalization and disenfranchisement; and where OS focuses its attention on local impacts, SM focuses its attention on impacts to "politics with a capital 'P'" (McAdam and Scott 2005).

Despite these stark contrasts, however, researchers from both disciplines have recently begun attempts to identify important synergies between them (Campbell 2005; Clemens 2005; McAdam and Scott 2005). One key area of synergy, bridging between theories of organizations and public collective action, is the recognized mechanisms by which both organizations and grassroots movements have been found to develop and change including (1) environmental mechanisms that externally influence actors' abilities to enact change, such as the presence of allies in a sitting political party, and (2) relational mechanisms, including both formal and informal networks (see also della Porta and Diani 2006) that connect organizations and individuals (Campbell 2005).

Research, then, that sets its unit of analysis on a particular organizational genre will have to wrestle with both definitional and methodological challenges. As more organizations take up new and hybrid repertoires, researchers will have to make decisions about how to handle organizations that don't fit traditional genres or that morph from one genre to the next. In this case, is a nonprofit organization still an object of empirical interest if it adopts the repertoires of a political party, instead? And even more challenging, perhaps, is the realization that fields of study develop methodological and theoretical biases based on organizational genre and that, eventually, these can serve to limit the generalizability and impact of the research.

Instead, I argue that a more holistic unit of analysis, focused on philanthropic work, enables an interdisciplinary approach to the study of work undertaken for the common good. It allows the research community to ask questions not just about the technologies being used, but to explore sociotechnical questions about how the relationships between technology and organizational form influence philanthropic work.

5 Conclusion

I have argued here that a focus on studying the design and use of technologies in nonprofit organizations or other institutions of civic engagement has significant limits. These limits stem from three primary characteristics and phenomena related to organizational function and form:

- Nonprofit organizations are shapeshifters. While these organizations may still be operating within a recognizable and internally consistent genre, nonprofits evolve to pick up the slack from other institutions and sectors as the sociotechnical context in which they operate changes. The philanthropic work undertaken by nonprofit organizations is constantly changing; at any given time, a particular philanthropic activity might be under their purview or under the purview of other institutions or sectors. To set one's unit of analysis on the nonprofit organization means that extended life cycles of philanthropic work cannot be studied as the sociotechnical context changes and the site for the work may or may not be within the unit of analysis.
- Nonprofit organizations have ill-defined boundaries. Not only does the scope of work around the boundaries of nonprofit organizations change; the boundaries, themselves, are ill-defined and even permeable. The extraordinary collaboration and interdependence among the organization and members of the public that serve as volunteers, donors, and advocates raises significant questions about who is "in" and who is "out" and what technologies are "in" and what technologies are "out." In the end, these distinctions limit our ability to the study whole of philanthropic work as it is carried out by individuals with complex relationships to organizations.
- Organizational genres are increasingly blurred. The repertoires of collective action that had previously been signals to the identity of one genre of organization have increasingly been taken up in blended and hybrid forms by different genres of organization. So to set one's unit of analysis around the nonprofit or other genre of organization is perilous as it is becoming increasingly unclear whether organizational genres will be at all differentiable moving forward.

Instead of plunging headlong into definitional questions of organizational form and function that will serve to significantly limit the scope of inquiry in this domain, I argue for a unit of analysis focused on the work, itself. Philanthropic informatics takes philanthropic work as its unit of analysis, and traces its influences and impacts

across individual and collective action, across sectors and boundaries, and across hybrid and dynamic organizational and institutional forms. It draws from research conducted across academic disciplines with the goal of supporting philanthropic work wherever it can be nurtured and provoked.

References

Brewer, M. B., & Gardner, W. (1996). Who is this "we"? Levels of collective identity and self representations. *Journal of Personality and Social Psychology, 71*(1), 83–93.

Brudney, J. L. (1994). Designing and managing volunteer programs. In R. D. Herman (Ed.), *The Jossey-Bass handbook of nonprofit leadership and management* (pp. 279–302). San Francisco, CA: Jossey-Bass.

Bureau of Labor Statistics, US Department of Labor. (2012). Volunteering in the United States—2012. Retrieved October 24, 2013, from http://www.bls.gov/news.release/pdf/volun.pdf.

Campbell, J. L. (2005). Where do we stand? Common mechanisms in organizations and social movements research. In G. F. Davis, D. McAdam, W. R. Scott, & M. N. Zald (Eds.), *Social movements and organizational theory* (pp. 41–68). Cambridge, England: Cambridge University Press.

Chadwick, A. (2007). Digital network repertoires and organizational hybridity. *Political Communication, 24*, 283–301.

Charmaz, K. (2006). *Constructing grounded theory: A practical guide through qualitative analysis*. Thousand Oaks, CA: Sage.

Clemens, E. S. (2005). Two kinds of stuff: The current encounter of social movements and organizations. In G. F. Davis, D. McAdam, W. R. Scott, & M. N. Zald (Eds.), *Social movements and organizational theory* (pp. 351–365). Cambridge, England: Cambridge University Press.

Corbin, J., & Strauss, A. (2008). *Basics of qualitative research: Techniques and procedures for developing grounded theory* (3rd ed.). Los Angeles, CA: Sage.

Cunnyngham, K., Sukasih, A., & Castner, L. (2013). Empirical bayes shrinkage estimates of state supplemental nutrition assistance program participation rates in 2008–2010 for all eligible people and the working poor. Retrieved October 24, 2013, from http://www.fns.usda.gov/ora/menu/Published/snap/FILES/Participation/Techpartrate2008-2010.pdf.

della Porta, D., & Diani, M. (2006). Chapter 5: Individuals, networks and participation. In *Social movements: An introduction*. (2nd ed). Malder, MA: Blackwell.

Dombrowski, L., Hayes, G. R., Mazmanian, M., & Voida, A. (2014). E-government intermediaries and the challenges of access and trust. *ACM Transactions on Computer-Human Interaction*, *21*(2), Article 13.

Dombrowski, L., Voida, A., Hayes, G. R., & Mazmanian, M. (2012). The social labor of service mediation: A study of the work practices of food assistance outreach**.** In *Proceedings of the ACM SIGCHI Conference on Human Factors in Computing Systems* (CHI 2012). Austin, TX, May 5–12. New York: ACM Press, pp. 1977–1986.

Farnham, S.D., & Churchill, E.F. (2011). Faceted identity, faceted lives: Social and technical issues with being yourself online. In *Proceedings of CSCW 2011*. New York: ACM Press, pp. 359–368.

Gladwell, M. (2010). Twitter, Facebook, and social activism: Why the revolution will not be tweeted. *New Yorker*. October 4, 2010, from http://www.newyorker.com/reporting/2010/10/04/101004fa_fact_gladwell

Giving USA. (2013). Giving USA 2013: The annual report on philanthropy for the year 2012. A publication of the Giving USA Foundation™, researched and written by the Indiana University Lilly Family School of Philanthropy.

Goecks, J., Voida, A., Voida, S., & Mynatt, E.D. (2008). Charitable technologies: Opportunities for collaborative computing in nonprofit fundraising. In *Proceedings of the ACM Conference on Computer-Supported Cooperative Work* (CSCW 2008). San Diego, CA, November 8–12. New York: ACM Press, pp. 689–698.

Goffman, E. (1959). *The presentation of self in everyday life*. New York: Anchor Books.

Hall, P. D. (1994). Historical perspectives on nonprofit organizations. In R. D. Herman (Ed.), *The Jossey-Bass handbook of nonprofit leadership and management*. San Francisco, CA: Jossey-Bass.

McAdam, D., & Scott, W. R. (2005). Organizations and movements. In G. F. Davis, D. McAdam, W. R. Scott, & M. N. Zald (Eds.), *Social movements and organizational theory* (pp. 4–40). Cambridge, England: Cambridge University Press.

National Center for Charitable Statistics. (1999). National taxonomy of exempt entities. Retrieved October 24, 2103, from http://nccs.urban.org/classification/NTEE.cfm.

O'Neill, M. (2002). *Nonprofit nation: A new look at the third America*. San Francisco, CA: Jossey-Bass.

Palen, L., & Liu, S. B. (2007). Citizen communications in crisis: Anticipating a future of ICT-supported public participation. In *Proceedings of CHI 2007*. New York: ACM Press, pp. 727–736.

Salamon, L. M., & Sokolowski, S. W. (2004). *Global civil society: Dimensions of the nonprofit sector* (Vol. 2). Bloomfield, CT: Kumarian.

Til, J. V. (1994). Nonprofit organizations and social institutions. In R. D. Herman (Ed.), *The Jossey-Bass handbook of nonprofit leadership and management* (2nd ed.). San Francisco, CA: Jossey-Bass.

Tilly, C. (1995). Contentious repertoires in Great Britain, 1758–1834. *Social Science History, 17*(2), 253–280.

Voida, A. (2011). Shapeshifters in the voluntary sector: Exploring the human-centered–computing challenges of nonprofit organizations. Interactions (Nov/Dec).

Voida, A., Dombrowski, L., Hayes, G. R., & Mazmanian, M. (in press). Shared values/conflicting logics: Working around e-government systems. *In Proceedings of CHI 2014*. Toronto, ON, April 26-May 1. New York: ACM Press.

Voida, A., Harmon, M.E., & Al-Ani, B. (2011). Homebrew databases: Complexities of everyday information management in nonprofit organizations. In *Proceedings of CHI 2011*. New York: ACM Press, pp. 915–924.

Voida, A., Harmon, E., & Al-Ani, B. (2012). Bridging between organizations and the public: Volunteer coordinators' uneasy relationship with social computing. In *Proceedings of CHI 2012*. New York: ACM Press, pp. 1967–1976.

Zandi, M. (2008). A second quick boost from government could spark recovery. Testimony to the U.S. House of Representatives Committee on Small Business. Retrieved October 24, 2013, from http://www.economy.com/mark-zandi/documents/Small%20Business_7_24_08.pdf.

Chapter 2
Understanding Internet Use in Grassroots Campaigns: Internet and Social Movement Theory

Lasse Berntzen, Marius Rohde-Johannessen, and James Godbolt

1 Introduction

Brussels, February 2004: One of the authors attended a seminar organized by the European Union, where he listened to a presentation made by Glaude (2004). He was an activist, part of the Association Electronique Libre, and he told an amazing story. During the fall of 2003, the European Commission proposed a new software patent directive. The open source community, other organizations and many individuals were concerned that the new patent directive would hinder innovation. A petition website was set up, and more than 300,000 signatures were collected. On September 24, 2003, the European Parliament passed the directive but with significant limits on the patentability of software. On July 6, 2005, the European Parliament rejected a revised proposal with 648 against 14 votes.

Holmestrand, Norway, February 2005: The majority coalition of the local government proposed introduction of a property tax. Since property tax had been downplayed as a non-issue during the municipal election campaign in 2003, some citizens felt deceived by the majority coalition. One citizen, Tommy Sundstrøm, took the matter in his own hands. He downloaded an open source petition application from the Internet, set up his own website and registered the domain name nok-er-nok.net (enough is enough) (Jarlsberg 2005a). By sending e-mails to friends and acquaintances, asking them to sign and also to forward the message, he was able to collect around 700 signatures within a short time (the city of Holmestrand has a population

L. Berntzen (✉) • M. Rohde-Johannessen
Department of Business and Management, Buskerud and Vestfold University College, Drammen, Norway
e-mail: lasse.berntzen@hbv.no; marius.johannessen@hbv.no

J. Godbolt
Department of History, Sociology and Innovation, Buskerud and Vestfold University College, Drammen, Norway
e-mail: james.godbolt@hbv.no

S. Saeed (ed.), *User-Centric Technology Design for Nonprofit and Civic Engagements*, Public Administration and Information Technology 6, DOI 10.1007/978-3-319-05963-1_2,

of approximately 10,000). The largest party (labour) changed their position, and the proposal was abandoned. The mayor made explicit references to the movement when explaining why the party changed position (Jarlsberg 2005b). Also, the majority coalition fell apart as a result of the successful campaign against the proposal (Jarlsberg 2005c).

Norway, 2011: Maria Amelie (Madina Salamova) was a 25-year-old illegal immigrant, who came to Norway with her parents when she was 15 years old. She was educated in Norwegian schools and universities and finished with a M.Sc. degree. All her friends were from Norway, and she had no connections in Russia, her country of origin. After 10 years, the Norwegian government decided to deport her. This caused an immediate reaction from friends, who started a Facebook campaign. In 2 days, the campaign page received more than 60,000 "likes"; after 1 week, the number was more than 90,000. She was eventually sent back to Russia, but the Norwegian government was pressured to change the regulations. She has now returned to Norway, working as a journalist (Aftenposten 2011). Even if the campaign focused on Maria Amelie, it brought attention to the way that long time illegal immigrants were treated. In many ways, Maria Amelie became a symbol for a larger cause.

These three case examples show that the Internet has become an important channel of exercising influence and acts to dispel concerns about the state of democracy. The Norwegian research project *Power and democracy*[1] conducted a study on the state of democracy in Norway between 1998 and 2003. One of the main conclusions of the study was that Norwegian democracy is in decline. Loyalty to political party politics and the broad social movements that characterized the period following World War II have been replaced by an electorate who moves from one party to the other. This, according to the study, means that political power is slipping away from parliament and moving towards non-governmental organizations (NGOs) and industry lobby groups (Østerud et al. 2003). This conclusion is supported by statistics showing that voter turnout has been in steady decline from the 1960s up until today (SSB Statistics Norway 2011).

While the authors of *Power and democracy* (Østerud et al. 2003) are concerned about the state of democracy, others claim that online engagement and engagement on single issues is a sign that democracy is not decaying, but rather is changing both in form and outlet. Graham (2008) claims we need to rethink what should be included as part of political discourse, and Castells (2000) argues that we are living in a network society where the Internet and various networks of citizens have created a networked space for engagement (Castells 2008). As long as the social context fosters participation and action (Roberts 2009), the Internet and social media can attract even more citizens to participate (Sæbø et al. 2009). The utilization of the power of the network to form communities of like-minded individuals can facilitate the formation of social movements or protest groups. (Svendsen and Svendsen 2006; Benkler 2006).

This chapter aims to discuss the impact of the Internet on such movements, by using social movement theory as a theoretical framework.

[1] For information in English, see http://www.sv.uio.no/mutr/english/index.html.

2 The Evolution of Social Movement Theory

Social movement theory has primarily been developed through studies of large social movements, like the peace movement or the women liberation movement. One definition of social movements was formulated by Moyer (2001): *Collective actions in which the populace is alerted, educated and mobilized to challenge the powerholders and the whole society to redress social problems or grievances and restore critical social values*.

Also, some definitions emphasize that social movements should attempt to build a radically new social order (Zirakzadeh 1997). In this context, it would be bold to categorize the above-mentioned examples as social movements. In our case, we have to do with three different protest groups. Karl-Dieter Opp (2009) has defined a *protest group* as a collectivity of actors who want to achieve their shared goal or goals by influencing decisions of a target.

Although one may trace the sociological interest for protest and forms for social unrest back to Marx, social movement theory, as we know it today, developed in the post-war period. It has changed and expanded greatly over time (McAdam et al. 1996; Beuchler 2011). Early studies of protest were dominated by theories of ideology and psychological approaches, focusing on crowd (i.e. deviant) behaviour. Later studies were influenced greatly by Olson's (1965) economic rational theory and were rooted in classic collective action theory. Theories of organization and rationality then became the theoretical trademark of social movement research, especially in North America. From the 1980s, social movement research was influenced by the cultural turn in the dominant European school of new social movements. The role of culture and identity in social movements was highlighted (Johnston et al. 1994), and more recently, scholars even returned to the question of emotions (Flam and King 2005). There have been attempts to synthesize the various approaches, and the social movement field has also expanded to encompass modes of contentious action from revolutionary movements to protest groups structured through networks (McAdam et al. 2001; Opp 2009). Chester and Welsh (2011) even argue that social movements today are entering a new stage, evolving into *network movements*.

Despite the cultural and emotional turn, theories of rationality and organization remain central to scholars interested in explaining protest regardless of whether it is based in a movement organization or a network. Based on costs, benefits and opportunities, rational actor theory explains protest actions and their mobilization modes, such as social movements, as the outcome of participants acting out of self-interest. One major theory, resource mobilization theory (Gusfield 1994), argues that social movements appear when participants are able to mobilize sufficient resources (money, people, etc.). Working within the same theoretical framework, some authors (McAdam 1996) have analysed social movements as part of the larger political process. The movement should have a political objective, aim to change society and be long lasting. When the goal has been achieved, i.e. change has been accomplished, the movement either ceases to exist or refocuses on a new societal issue. Another important contribution to social movement theory from social scientists of the rational school is the concept of a protest or action repertoire (Tilly 1986; Tilly and

Wood 2012). A protest repertoire is a set of means, tactics and strategies that protest groups can utilize in their campaigns. A protest repertoire is historically embedded and dependent on social custom and political circumstances, as well as communication technology.

2.1 Social Movement Theory in Studies of Technology

Several scholars have in recent years applied social movement theory to studies of Internet-based grassroots campaigning. Bevington and Dixon (2005) ask whether social movement theory is relevant for the actors being studied and conclude: "we see a promising, emerging movement-relevant approach, one based on direct, dynamic engagement with the concerns and questions of movements themselves" (p. 203). A similar study points to the diversity in application of social movement theory and through a literature review shows how the Internet can both sustain and demobilize social movements.

Other studies examine the practical implications and results. Technology can facilitate collaboration, destabilize existing organizational hierarchies and lead to increased collaboration between organizations (Garrett 2006). Grassroots efforts to influence media coverage of social and economic issues have also been examined, and social movement theory was shown to provide valuable insights for researchers (Carroll and Hackett 2006). A survey of US social movements revealed that a majority of social movements were not utilizing the Internet to its full potential (Stein 2009). As a result, the author calls for further research into different types of social movements, the resources and constraints they face, linkages between different social movements and user studies of movement websites. Social movement scholars have argued that the Internet has indeed had a revolutionary effect on protest because it has created new publics and withdrawn the boundary between the public and the private, thus increasing greatly the demand side of protest (Polletta et al. 2013).

Further, there are several case studies of online social movements. Examples include online petitions against Yahoo.com closing several websites created by Yahoo members (Gurak and Logie 2003); a study of Indymedia, a user-driven alternative news website (Kidd 2003); digital anti-globalization protests against the World Bank (Vegh 2003); and a social network analysis of the Zapatista movement in Mexico (Garrido and Halavais 2003). These case studies contribute to uncovering the breadth of social movements and the various ways in which the Internet has been used to further the movements' objectives.

3 The Relevancy of Social Movement Theory

We argue that concepts and theories developed by social movement researchers are relevant to the understanding of Internet-based protest even if the object of investigation, as in our three cases, does not necessarily qualify as a social movement as

defined above (Moyer 2001). Social movement theories deal, as we have indicated previously, with the larger field of collective action and are thus relevant to understanding protest groups and their campaigns. Our cases certainly lack the durability of social movements, although lifespan may be coming less important, since technology may reduce time to achieve a result. Our protest cases do, however, classify as collective actions, which alerted, educated and mobilized the populace to challenge the powerholders. The protest campaigns in our study, again with the exception of the Amelie case, did not redress social problems. For sure, one may argue that introduction of a patent directive or property tax is a grievance, but there is no question of restoring critical social values as stated by Moyer.

These two rather mainstream campaigns deviate also from Zirakzadeh's (1997) criterion of promoting a broader and alternative social vision to that of the establishment. However, his definition also emphasizes that social movements are non-elitist, meaning that social movements operate outside the system of party politics. It has also been pointed out that social movements use political confrontational and socially disruptive tactics, actions that often breach political rules and conventional norms (Flacks 1994; Zirakzadeh 1997). All three examples in our study were non-elitist grassroots initiatives and operated from outside formal political institutions. They also employed means typical for the protest repertoire of social movements, using political confrontational and socially disruptive tactics by making a lot of "noise" helped by mass media.

Our cases involve concrete political decision-making, and the most political of the social movement theories, political process theory, contains concepts that can be fruitful for analysis. According to this theory, there are three central factors that can explain the formation of social movements (McAdam et al. 1996):

- Political opportunities
- Mobilizing structures
- Framing process

A political opportunity must exist. In order to mobilize, there must be reasonable chance to change current policy. If no one believes it is possible to do something about a problem, it will be impossible to mobilize. There must also be some kind of structure that makes it possible to enrol supporters of the movement. McCarthy (1996) tried to enumerate the range and variety of mobilizing structures. He stressed the importance of existing informal human networks such as kinship and friendship networks for mobilization. But mobilizing structures may also include such things as the Internet, including social media. In this context technology may help mobilization by rapidly enlarging the network, but also to coordinate the different resources enrolled. Without mobilizing structures, it will be impossible to mobilize. Lastly, there must be a clear message that is well understood by people deciding to support or not to support the movement. The process of message presentation, framing, is critical to the formation of collective protest. If there is no clear message, it will be impossible to mobilize.

4 Applying Theory to Case Examples

In all three cases described in the introduction, there was a political opportunity. In the two first cases, the issues were to be voted on by the political system within a short time frame. The third case (Maria Amelie) was about an issue that had recently been debated, not only amongst political parties but also within the government party. It was well known that different fractions were arguing about how refugees should be treated.

Therefore, this case was a spark that rekindled an already built fire.

All three cases also had a clear framing process. The messages communicated were simple. The software patent directive would undermine innovation. The introduction of property tax would violate promises made during the election campaign. Maria Amelie would be sent home in spite of her growing up in Norway. That she also had finished her master's degree made her stand out as different from many other refugees. She was not unemployed and criminal; she was highly educated with excellent Norwegian language skills and many (and only) Norwegian friends.

In all three cases, supporters were enrolled through the use of the Internet (Glaude 2004; Jarlsberg 2005a): E-mail was used to urge people to join the movements. Web-pages were used both to inform the public and to collect signatures, and in the case of Maria Amelie, social media was used extensively. The use of Internet was crucial to all three grassroots campaigns.

It seems clear, protest groups using these kinds of campaigns believe in the concept of participatory democracy (Pateman 1970). They raise expectations that people can and should be involved in the decision-making process in all aspects of public life, and they use technology to enrol people to form a collective action.

Figure 2.1 shows a model for social media use. Typical use starts with informing the users/supporters while building the network. The network is then mobilized, and network participants are asked to disseminate information to friends and even take part in physical events. The third stage is when social media is used to interact amongst the users to plan and coordinate the campaign.

At the same time, use of technology, in particular social media, may attract supporters with a more shallow commitment to the cause. It is much easier to support a cause on social media, e.g. using the "like" button in Facebook, than to join a street march or engage in other time-consuming protest activities. This superficial approach to activism has been called clicktivism.

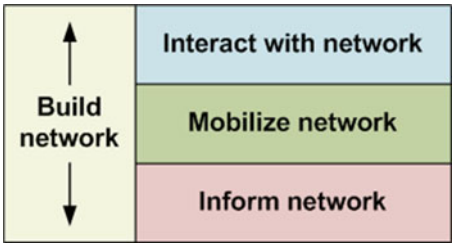


Fig. 2.1 Maturity of social media use

5 Analysis and Discussion

The three grassroots campaigns described in the introduction span almost a decade, and they were all successful. The two early campaigns were both based on petitions, while the last one used social media. Technology has always been important for grassroots campaigns, from the printing of leaflets, to distribution of cassette tapes, to electronic communication through Internet and mobile phones. The use of technology has given organizers tactical advantages; it has been easier to initiate campaigns and enrol supporters. Technology also makes it easier to coordinate resources and communicate with the followers. The model presented in Fig. 2.1 illustrates this especially through the interaction phase. While the two petitioning cases used technology to inform and mobilize, the Maria Amelie case was able to go one step further. Aided by the communicative and network features available through social media, this campaign managed to interact with sympathizers and organize events and protests, reaching out to hundreds of thousands of people as more and more participants shared and discussed the case on Facebook and Twitter.

One observation is that the three campaigns did not exist on Internet only. All three campaigns had a protest repertoire, including demonstrations, sit-downs, etc. But we found the most important interplay to be between the campaign and the mass media. When each campaign reached a critical mass, the mass media started mentioning them. This brought the messages to more people, which again prompted them to use the Internet to show their support. As the campaigns grew, so did the attention of mass media. This is an upward spiral effect caused by this ongoing interplay between campaigns and mass media.

The use of social media made this interplay even stronger. Traditional media reported on the messages delivered on Facebook and number of likes. The protest group members reported whenever the traditional media wrote about the case. This made the upward spiral effect very strong.

Another observation concerned new ways of utilizing social media, most importantly the use of social media to report in real time. Typical examples of real time messages were:

- Interview on national broadcasting channel now
- She is now put in the police car

It is important to recognize that a social media campaign seldom lives its own life. It is often one element in a repertoire of means to achieve a goal.

6 Future Implications for Politics

In most countries, the voter turnout has decreased during the last decades. Fewer citizens are members of political parties. Yet political mobilization is still happening around specific political issues.

One government study observes that on the local level, there is often mobilization for specific issues (NOU 2001:3). This observation is not related to technology but to the fact that people are mobilizing. As Flacks (1994) observed, movements rather than parties are more likely to be vehicles of popular voice.

This has some implications for the political system. First, the three cases reported here show that while voter turnout is decreasing, political engagement is not necessarily lower. Rather, it is changing form and moving towards grassroots activism on single issues. This means that in order to be seen as relevant by citizens, political parties should consider deeper engagement with these types of campaigns. Second, we show that the Internet, especially social media, is being used as a mobilizing structure for several different kinds of grassroots campaigns. Once the political opportunity is identified and action is initiated, the Internet can facilitate mobilizing structures through its inherently networked nature, aiding activists in reaching out with their message. By using websites, social media spaces and other Internet technologies, the Internet also facilitates the framing process of social movements. The model presented in Fig. 2.1 also shows how in particular social media can aid campaigns in reaching out to a broader public, as well as being a tool for organizing protests and meetings amongst participants in the campaign. While the fact that grassroots campaigns use the Internet is not new, using social movement theory as a lens for analysing these campaigns provides valuable insight into the mechanisms that drive and shape campaigns. Finally, the finding that traditional mass media tend to cover stories that emerge online shows that successful campaigns should work towards achieving this synergetic effect. With mass media attention for a case already high on the online attention ladder, we see an upward spiral of awareness that further aids the campaign organizers to gain sympathy for their cause.

This chapter has shown how Internet may be used as a mobilizing structure. There is reason to believe that the use of Internet and social media for this purpose will increase in the forthcoming years (Castells 2013).

7 Conclusion

This chapter has tried to put the impact of Internet use in movements into a theoretical context. The Internet provides tools that support the mobilizing structures and framing process of campaigns, and this understanding can aid future campaigns in their planning. Movement organizers can benefit from the use of Internet to enrol supporters and organize events and utilize social media to interact with the broader supporting network and increase awareness of the issue at stake. With enough support from online channels, traditional media tend to cover the story as well, leading to an upward spiral of awareness for the campaign.

References

Aftenposten. (2011, December 21). *Lykkelig som lovlig norsk*. Oslo, Norway: Aftenposten Morgen.

Benkler, Y. (2006). *The wealth of networks: How social production transforms markets and freedom*. New Haven, CT: Yale University Press.

Beuchler, S. (2011). *Understanding social movements: Theories from the classical era to the present*. Boulder, CO: Paradigm.

Bevington, D., & Dixon, C. (2005). Movement-relevant theory: Rethinking social movement scholarship and activism. *Social Movement Studies, 4*(3), 185–208.

Carroll, W. K., & Hackett, R. A. (2006). Democratic media activism through the lens of social movement theory. *Media, Culture & Society, 28*(1), 83–104.

Castells, M. (2000). Materials for an exploratory theory of the network society. *The British Journal of Sociology, 51*(1), 5–24. doi:10.1111/j.1468-4446.2000.00005.x.

Castells, M. (2008). The new public sphere: Global civil society, communication networks, and global governance. *The ANNALS of the American Academy of Political and Social Science, 616*(1), 78–93. doi:10.1177/0002716207311877.

Castells, M. (2013). *Networks of outrage and hope. Social movements in the Internet age*. Cambridge, England: Polity Press.

Chester, G., & Welsh, I. (2011). *Social movements: The key concepts*. London: Routledge.

Flacks, R. (1994). The party's over—So what is to be done? In E. Laraña, H. Johnston, & J. R. Gusfield (Eds.), *New social movements: From ideology to identity* (pp. 330–351). Philadelphia: Temple University Press.

Flam, H., & King, D. (Eds.). (2005). *Emotions and social movements*. London: Routledge.

Garrett, R. (2006). Protest in an information society: A review of literature on social movements and new ICTs. *Information, Communication & Society, 9*(2), 202–224.

Garrido, M., & Halavais, A. (2003). Mapping networks of support for the Zapatista movement: Applying social network analysis to study contemporary social movements. In M. McCaughey & M. D. Ayers (Eds.), *Cyberactivism: Online activism in theory and practice* (pp. 165–184). London: Routledge.

Glaude, D. (2004) Fluid virtual politics. Case of SW Patents. Presentation made at European Commission workshop on e-Democracy, February 12th–13th 2004, Brussels.

Graham, T. (2008). Needles in a haystack: A new approach for identifying and assessing political talk in nonpolitical discussion forums. *Javnost—The Public, 15*(2), 17–36.

Gurak, L. J., & Logie, J. (2003). Internet protests, from text to web. In M. McCaughey & M. D. Ayers (Eds.), *Cyberactivism: Online activism in theory and practice* (pp. 25–46). London: Routledge.

Gusfield, J. R. (1994). Reflexivity of social movements. In E. Laraña, H. Johnston, & J. R. Gusfield (Eds.), *New social movements: From ideology to identity* (pp. 58–78). Philadelphia: Temple University Press.

Jarlsberg (2005a). Nett-storm mot eiendomsskatt. Retrieved November 27, 2013, from http://www.jarlsbergavis.no/nyheter/article1446157.ece

Jarlsberg (2005b). Tok signalet fra befolkningen. Retrieved November 27, 2013, from http://www.jarlsbergavis.no/nyheter/article1452851.ece

Jarlsberg (2005c). SV bryter alliansen. Retrieved November 27, 2013, from http://www.jarlsbergavis.no/nyheter/article1456858.ece

Johnston, H., Laraña, E., & Gusfield, J. R. (1994). Identities, grievances, and new social movements. In E. Laraña, H. Johnston, & J. R. Gusfield (Eds.), *New social movements: From ideology to identity* (pp. 3–35). Philadelphia: Temple University Press.

Kidd, D. (2003). Indymedia.org: A new communications commons. In M. McCaughey & M. D. Ayers (Eds.), *Cyberactivism: Online activism in theory and practice* (pp. 47–70). London: Routledge.

McAdam, D. (1996). Conceptual origins, current problems, future directions. In D. McAdam, J. D. McCarthy, & M. N. Zald (Eds.), *Comparative perspectives on social movements* (pp. 23–40). Cambridge, MA: Cambridge University Press.

McAdam, D., McCarthy, J. D., & Zald, M. N. (1996). Introduction: Opportunities, mobilizing structures, and framing processes—toward a synthetic, comparative perspective on social movements. In D. McAdam, J. D. McCarthy, & M. N. Zald (Eds.), *Comparative perspectives on social movements* (pp. 1–20). Cambridge, MA: Cambridge University Press.

McAdam, D., Tarrow, S., & Tilly, C. (2001). *Dynamics of contention*. Cambridge, MA: Cambridge University Press.

McCarthy, J. D. (1996). Constraints and opportunities in adopting, adapting, and inventing. In D. McAdam, J. D. McCarthy, & M. N. Zald (Eds.), *Comparative perspectives on social movements* (pp. 141–151). Cambridge, MA: Cambridge University Press.

Moyer, B. (2001). *Doing democracy*. Gabriola Island, Canada: New Society.

NOU 2001:3. Velgere, valgordning, valgte. Norges Offentlige utredninger.

Olson, M. (1965). *The logic of collective action*. Cambridge, MA: Harvard University Press.

Opp, K.-D. (2009). *Theories of political protest and social movements*. London: Routledge.

Østerud, Ø., Engelstad, F., & Selle, P. (2003). *Makten og demokratiet: En sluttbok fra Makt- og demokratiutredningen*. Oslo, Norway: Gyldendal akademisk.

Pateman, C. (1970). *Participation and democratic theory*. Cambridge, England: Cambridge University Press.

Polletta, F., Chen, P., Gardner, B., & Motes, A. (2013). Is the Internet creating new reasons to protest? In J. van Stekelenburg, C. Roggeband, & B. Klandermans (Eds.), *The future of social movement research*. Minneapolis, MN: University of Minnesota Press.

Roberts, B. (2009). Beyond the 'Networked Public Sphere': Politics, Participation and Technics in Web 2.0. Fibreculture (14). Available at: http://journal.fibreculture.org/issue14/issue14_roberts.html.

Sæbø, Ø., Rose, J., & Nyvang, T. (2009). The role of social networking services in eParticipation. In A. Macintosh, & E. Tambouris (Eds.), *ePart ´09 Proceeedings of the 1st International Conference on Electronic Participation*. Berlin, Heidelberg: Springer.

SSB Statistics Norway. (2011). Municipal and county council election, 2011. Retrieved October 16, 2013, from http://ssb.no/en/valg/statistikker/kommvalg

Stein, L. (2009). Social movement web use in theory and practice: A content analysis of US movement websites. *New Media & Society, 11*(5), 749–771.

Svendsen, G. T., & Svendsen, G. L. H. (2006). *Social Kapital—En introduction*. Copenhagen, Denmark: Hans Reitzels Forlag.

Tilly, C. (1986). *The contentious French*. Cambridge, MA: Harvard University Press.

Tilly, C., & Wood, L. (2012). *Social movements 1768–2012*. Boulder, CO: Paradigm.

Vegh, S. (2003). Classifying forms of online activism: The case of cyberprotests against the world bank. In M. McCaughey & M. D. Ayers (Eds.), *Cyberactivism: Online activism in theory and practice* (pp. 71–96). London: Routledge.

Zirakzadeh, C. E. (1997). *Social movements in politics: A comparative study*. New York: Addison Wesley Longman.

Chapter 3
The Impact of the Internet on Global Networks: A Perspective

Shefali Virkar

1 Introduction

In 1844, Samuel Morse launched the era of instant communication by telegraphing the prophetic words 'What hath God wrought!' A few years later, on her diamond jubilee, Queen Victoria tapped out a few words in Morse code, sending greetings to her subjects around the world. By modern standards, the capacity of the wire was puny, and few in 1897 could afford to send a telegraph message. Nonetheless, fact remains that for the first time, a communications network linked the British Empire and effectively the whole globe.

New technology is changing the world. Although the idea of a communications network spanning the globe is not new, the past three decades have seen the emergence of a vast global network of computers whose effect on the global political arena has been more significant than any previous technology revolution. This chapter will take a brief look at two iconic transnational civil society networks: the *Zapatista Solidarity Movement* and the *campaign against the Multilateral Agreement on Investment* (*MAI*), and the way in which they have harnessed and have been impacted by the Internet, 'the biggest technological juggernaut that ever rolled' (Gilder 1999).

2 Plugging In: A Brief Background to the Internet

In 1962, an academic at the Massachusetts Institute of Technology (MIT), J.C.R. Licklider, circulated a series of memos elaborating an idea that he called the 'Galactic Network', a concept that envisioned 'a globally interconnected set of

S. Virkar (✉)
Department of Politics and International Relations, Keble College,
University of Oxford, Parks Road, Oxford OX1 3PG, UK
e-mail: shefali.virkar@politics.ox.ac.uk

S. Saeed (ed.), *User-Centric Technology Design for Nonprofit and Civic Engagements*,
Public Administration and Information Technology 6, DOI 10.1007/978-3-319-05963-1_3,

computers through which everyone could quickly access data and programs from any site.' He later became the first person to head the computer research programme at the Advanced Research Project Agency (ARPA), a division of the US Department of Defense, where he quickly convinced his successors about the importance of his idea. His ideas soon converged with those of Paul Baran, an engineer at the American think-tank RAND Corp., whose work stemmed from the concern that a leader of an unfriendly state would be tempted to take advantage of the ease with which military communications could be disrupted and launch a pre-emptive nuclear strike on the USA circumventing its current digital arrangement. As an alternative to conventional circuit switching technology, therefore, which focused on a single line of communication, Baran suggested the creation of a nationwide network of computers to head off such a catastrophe (Abbate 2001).

Licklider and Baran's ideas were soon put to the test with the creation of the ARPANET, which commenced operations in the early 1970s. The aim of ARPANET was to make the research on military defence-related issues efficient by enabling researchers and their government sponsors to share resources without having to physically deliver them. The informal collegial, nonhierarchical working relationships that evolved were the chief cause of ARPANET's early success, ultimately resulting in that of the Internet and its associated technologies as we know it today (Wartenkin 2001). ARPANET's users were also involved in its development: the most significant addition being the introduction of *electronic mail* or *e-mail*, an application that very soon became the most popular feature of the project. From a means of sharing data, the ARPANET thus became a medium of instantaneous and rapid communication.

The late 1980s saw a boom in the sale of personal computers (PCs) and a gradual opening of the Internet to public access. The creation of the World Wide Web in the mid-1990s, following the almost complete privatisation of the ARPANET a few years earlier, completed the transformation of the Internet from a purely defence-related research tool to a popular communication medium that allowed for 'information gathering, social interaction, entertainment, and self expression' as well as the overall interaction of many with many on a global scale. Today, the Internet is shaping and is constantly being shaped by the activities of its users like never before. It is inexpensive and increasingly popular—current estimates suggest that over 2.5 billion people were online as of September 2012, up from a little over 600 million in September 2002 (Internet World Stats 2012). From its inception, the people and groups who use the Internet have had their own 'agendas, resources, and visions' for its future, making its history 'a tale of collaboration and conflict amongst a remarkable variety of players' (Abbate 2001).

The explosion in the number of civil society networks dependent on the Internet and its associated technologies over the last few years has been touted as one of the most dramatic and intriguing changes in current world politics (Wartenkin 2001). These groups and their ideas proliferate across borders and infiltrate nearly all major political arenas, thereby altering the landscape of international political economy with their promise of forging a global civil society that is altogether more just and equitable. Delivering this promise, however, depends on the ability of these groups

and networks to communicate with each other quickly over vast expanses of space and time; and it is in this endeavour that new communication technologies, particularly the Internet, have played and will continue to play a crucial role (Frangonikolopoulos 2012). One of the more innovative means used by global civil society for mobilisation and communication has been the Internet, which, since its initial inception and subsequent commercialisation, has provided unprecedented opportunities for the exchange of information outside the control of the dominant mainstream media (Fenton 2007). The prevalence of such information and resources not otherwise available in the mainstream media, and stemming from alternative sources that may otherwise not be heard or easily accessed, has thus the potential to greatly enhance the quality of action in global civil society and the tools available to actors involved in social and political grassroots struggles.

Political observers and social critics are divided, however, as to the nature and ultimate significance of such citizen networks; with the more optimistic (encompassing a broad spectrum ranging from Gramscians to liberals) seeing these networks as being by and large positive expressions of democracy in arenas dominated by nation states and cross-border companies and as having an ever increasing significance on world affairs (Deibert 2000). A second line of argument takes a more cautious approach and vocalises an oft-muted concern that, instead of citizen-focused mass democracy, the global arena will be dotted with millions and millions of niche interests. More particularly, there are those who associate the advent of the Internet with the idea of the information 'haves' and 'have-nots' and are wary of the consequences ensuing from the so-called digital divide (Zinnbauer 2001). Finally, there are those who believe that, far from being constructive, the Internet is harmful to true global civil society and that an increasingly digital society results in a gradual decline in an individual's social circle and in the ultimate destruction of social capital which can only be built up and maintained through continuous face-to-face interaction (Huysman and Wulf 2004).

This book chapter examines the impact that the use of the Internet and its opportunities for global networking has had on two different types of social activist networks: the Zapatista Solidarity Network (which emerged in the early 1990s as a result of the Zapatista Uprising in Mexico) and the anti-MAI campaign (which helped bring down the MAI in 1998). It begins with a brief overview of the concept of digital networking, before moving on to the advantages of the Internet for social networks in general. It then takes a brief look at the background of each of the two case studies and the way in which the key actors in each network made use of the Internet. Finally, the chapter concludes with an assessment of the implications of the Internet revolution for civil society networks in the twenty-first century.

3 Networks and Networking: Connecting for Success

The Internet is altering the landscape of political discourse and advocacy in a way no other technology has done before (Virkar 2014). It has proved of great use to those who wish to influence foreign policy and the international decision-making

process, particularly non-state actors—both individuals and organisations. Cyber activism (otherwise known as Internet activism or *hacktivism*) involves *a normal, nondisruptive use of the Internet in support of an agenda or cause*, such as the use of the web as an information resource; the construction of user-friendly websites and the posting of material for public viewing; the use of e-mail to disseminate information and electronic publications and letters; and the use of the World Wide Web as a place to discuss issues, form alliances, and to plan and co-ordinate activities (Jordan and Taylor 2004). Coupled with a steadily growing online community, the Internet has become a powerful, inexpensive medium through which ideas and agendas may be communicated. The beauty of the Internet lies in its ability to cross national boundaries, enabling people and organisations from diverse geographical regions to come together to influence foreign policy anywhere in the world (Denning 2001).

Today, many virtual communities are focused on shared political beliefs, and there are a number of websites encouraging online activism (Wall 2007). The owners of some websites, such as Netaction.com, have even published online 'how-to' guides and training programmes, which inter alia aim to adapt and popularise the use of e-mail, cyberspace networking, Internet relay chats, instant messaging, and intranets as a means of expanding and sustaining the cyber activist community. As the Virtual Activist training manual proclaims,

… Although you'll need some special skills to build and maintain a Web site, e-mail is easily mastered even if you have little or no technical expertise. If you can read and write and your computer has a modem, you can be a Virtual Activist! (Krause et al. 2006)

The successful use of the Internet by civil society organisations lies chiefly in the key organisational process of *networking*. A critical concept, particularly in the context of collective action in the Information Age, the idea of a network is fundamental to an understanding of the dynamics of both online communication and collaboration and to the work that civil society organisations carry on offline (Wall 2007). In theory, a network consists chiefly of a number of nodes connected to each other in a loose, horizontal, flexible structure that may expand and integrate new nodes and satellites, as long as communication and information flows between the key nodes are maintained (Castells 1996).

It is easy to infer, therefore, that the emergence of the Internet would greatly benefit the setting up and maintenance of civil society networks in the today's world. Effective use of the Internet and its associated technologies does indeed seem to mitigate traditional difficulties of conventional civil society networks, particularly those issues pertaining to the co-ordination of functions, focusing its resources on specific goals and restraints placed on it due to its size and complexity (Van Laer and Van Aelst 2010). Scholars of digital society such as Castells often credit the Internet as being the technological basis of form that civil society networks take in the Information Age. Accordingly, the use of technology results in networks having a potent combination of 'flexibility and task performance, co-ordinated decision-making and decentralised execution, of individual expression and global horizontal communication which provide a superior form for human action' (Castells 2001, p. 2).

4 Networking Dissent: Cyber Activists Use of the Internet

The Internet may be put to a variety of uses by civil society organisations (Arquilla and Ronfeldt 2001). The five main modes of Internet usage listed and elucidated upon below. These modes are by no means unrelated and are frequently used in combination by civil society networks to enhance their efficacy (Harwood and Celeste 2001).

Collection: The Internet is a vast storehouse of information, most of it available for free. Today, fact sheets, policy statements, legislative documents, academic papers, critiques and analyses, and other items relating to a wide variety issues are available for download online. Activists can get hold of whatever material they need at the click of a button, using one of the many search engines, e-mail lists, or chat services available online. News channels providing almost minute-to-minute updates are also available and prove especially invaluable to groups wishing to monitor ongoing events. In addition, websites provide activists with information on how to use the Internet, its associated applications, and digital technologies more effectively.

Publication: Organisations use the Internet to post and distribute information for public consumption. They can create interactive websites that provide global audiences and may include fact sheets, reports, lectures, and interviews. They may publish online journals and create mailing lists, online discussion groups, and bulletin boards. By using the Internet to publish and disseminate information, civil society groups can take advantage of its relatively low costs whilst at the same time reaching out a global audience. The interwoven nature of the World Wide Web, with its links, attachments, and hypertext, enhances its effectiveness as a medium of effective and far-reaching information dissemination.

Dialogue and Debate: E-mail, newsgroups, web forums, chat rooms, and the like provide to civil society multiple forums for the discussion and debate of various issues. For instance, the use of chat rooms has been a subject of robust debate amongst social scientists, with some scholars touting on the one hand virtual discussions as being as good for the building of social capital amongst network members as face-to-face conversations, and with others believing that the only outcome of such impersonal communications is a gradual decline in the quality of interpersonal relationships.

Organising and Mobilising: Advocacy groups use the Internet to increase awareness and mobilise people to rally around an issue. The Net also enables groups to co-ordinate action amongst members and with other organisations and individuals, across borders and across time zones. Plans of action may be circulated via e-mail or posted on websites, which exist solely to facilitate better co-ordination between different members of a network.

Lobbying Decision-Makers: The Internet facilitates the lobbying of those in power and has contributed to the success of many online campaigns. In particular, the use of e-mail has become very popular with, for example, e-mails containing sample

protest letters being sent to people on electronic mailing lists or through the setting up of e-mail boxes by activist groups to gather signatures for petitions. These days, almost everyone who's anyone in the echelons of power and civil society has an e-mail address, and some websites meticulously compile a list of such government officials and urge people to write in to them. It is not clear, however, just how successful such lobbying campaigns are. It is possible that, with e-mail software to block certain types of incoming electronic mail and the use of standard, automatically generated replies used to respond to electronic petitions, campaign success depends on how well augmented the use of the Internet and associated platforms is with more traditional offline methods, backing the argument made by some that the Internet alone is not an adequate tool for public political movement.

There are, however, several disadvantages or potential drawbacks to the use of the Internet that can limit its usefulness to grassroots groups engaged in political action. More specifically, many of these 'downsides' depend on what facets of the Internet are used and the context within which they are applied. Much like the advantages of the Internet discussed above, some have to do with the medium's unique characteristics.

The Internet Is a Single Source of Communication: Although the Internet was designed for robustness during the time of emergency, disruptions in the global network of networks can and have occurred. In July 1997, for example, Internet traffic 'ground to a halt' across much of the USA because of a freak combination of technical and human errors, forewarning what some Internet experts believed could someday be a more catastrophic meltdown (Chandrasekaran and Corcoran 1997). Similarly, at a micro-level, Internet crashes and outages are a regular feature of everyday life of the world over. Other, older, technologies such as the facsimile and the telephone continue to have an advantage over the Internet in particular situations, particularly if a sender needs immediate acknowledgement or if information is required urgently or covertly or both (Virkar 2014).

Communications Over the Internet Can Be Easily Monitored: Public platforms and Internet websites are easy to monitor and control, particularly by state organisations or individuals with the appropriate technical know-how. Further, private one-to-one electronic messages may be slightly more secure; however, these again can be hacked by anyone with sufficient technical knowledge. Whilst data encryption packages may provide a solution to individuals and organisations exchanging private or classified information, these programmes and their related technologies might for a while remain out of reach of the majority of Internet users (Danitz and Stobel 2001).

Opponents May Try to Use the Internet for Sabotage: This disadvantage is related to many of the concerns discussed above but represents a more active use of the Internet by activists, hacktivists, and cyber criminals alike to trick, disrupt, or otherwise sow dissension (de Armond 2001). This is because the Internet allows anonymity and makes it possible for provocateurs posing as someone or something else to try to cause dissension or sidetrack the campaign by posting messages for that purpose (Kalathil and Boas 2010).

Information on the Internet Is Unmediated: One of the advantages of the Internet for activists and many other users, of course, is the fact that it allows them to dispense with the traditional filters for news and information (Virkar 2014). It allows users to self-select information they are interested in and retrieve data in far more detail than available in a newspaper or, certainly, a television programme. This same lack of structure, however, can present dangers, allowing for wide and rapid dissemination of information that is of questionable accuracy, being factually incorrect or propagandistic, including material that is racist, sexist, or otherwise hateful and incendiary (Arquilla and Ronfeldt 2001).

Access to the Internet and Technical Know-How Is Not Equal: Not all who wish to play a role in a campaign for change have access to the most modern tools of communication, including computers, modems, and the necessary telephone lines or other means to connect to the Internet. As already noted, access to encryption methods that allow for more secure communication may be limited, and technical knowledge concentrated in a small pool of hacktivists bent on causing destruction (Norris 2001).

The Internet Cannot Replace Face-to-Face Contact: Put simply, the Internet and other communications media cannot replace human interaction. Rather, the Internet has its own set of advantages and disadvantages, with Internet campaigns, because of their decentralised electronic nature, being decidedly unstable (Juris 2005). Whilst the use of the Internet may supplement face-to-face interactions, it cannot wholly substitute for them as personal interactions constitute nearly all initial campaigning groundwork (Kalathil and Boas 2010).

Have transnational civil society networks been able to harness the potential benefits of the Internet and online networking to mount international campaigns for social change? Or is the power of the Internet merely a chimera, unable to deliver on its promises? The following section briefly outlines two cases under study, the Zapatista Movement in Mexico and the global anti-MAI campaign, and examines the role of the Internet and its associated digital platforms in both instances.

5 The Case Studies: Net Resistance = Net Benefits?

The following case studies examine the use of the Internet and its associated technologies by civil society networks worldwide. Though seemingly different, there are uncanny similarities. Firstly, both focus on the Internet's impact on global market forces and globalisation, issues at the heart of recent events in international political economy and ones that are bound to increase in importance in the years to come. Political commentators might also see them as proof that citizen networks offer a counter-hegemonic alternative against capitalism and the state. Secondly, temporary success in both examples has been achieved by the networks concerned: the Mexican government has been pushed onto the back foot by the Zapatista solidarity movement, and the importance of the MAI has been lessened and discussions themselves are partially off the OECD agenda. The final common denominator, and

the real reason behind the choice of these two case studies, is the fact that the successes of both these networks have been attributed wholly to the Internet and to the rapid proliferation of digital technologies. The high correlation between their successes and their participants' use of the World Wide Web and the potential lessons that future campaigns might learn from these experiences are the two chief reasons that make the chosen studies key to an understanding of the role that Internet plays in shaping global political architecture.

5.1 The Zapatista Movement

This is the story of a local armed insurgency that transformed into an international campaign for democracy and for the social market economy in Mexico. In 1994, subsequent to the introduction of the North American Free Trade Agreement (NAFTA), the Zapatista National Liberation Army (EZLN), a little-known rebel group composed mainly of Mayan Indians, shot to international fame by launching a violent uprising in the impoverished Mexican province of Chiapas, capturing seven towns and holding their inhabitants. Chiapas had been an integral part of Mexican and global capitalism for some time, and its people had long suffered at the hands of government repression (Cleaver 1998).

The Zapatistas' chief aim was to focus international attention on the (perceived) exclusion of indigenous Indians in the province, as also in Mexico, as a consequence of globalisation and economic liberalisation (Mora 2008). The irony of the situation wasn't lost on many; the rebellion focused the world's attention on people excluded by the very forces that the NAFTA was supposed to celebrate (Gilbreth and Otero 2001). In the early stages of the uprising, the Internet was chiefly used by academics in Central America and elsewhere as a research tool used for gathering information on the conflict and to learn more about the background of the Zapatistas. As the insurgency spread, and as the Mexican government sent in the army to quell it, the Internet filled the lack of coverage of the rebellion on mainstream media, a result of censorship measures taken by the Mexican government. An electronic network of civil society participants soon sprang up, originating particularly from La Neta (an Internet-based women's network working in collaboration with the San Francisco Institute of Global Communication), and soon, e-mail discussion lists, interactive websites, and electronic petition lists began to mushroom online (Martinez-Torres 2001).

Back on the battlefield, the insurgents were being quickly outnumbered and outmanoeuvred by the better-trained, better-equipped Mexican army. However, coverage on the Internet had raised the international visibility of the conflict, making it difficult for the Mexican government to suppress the uprising with the force it would have liked to use, and after only a few days into the ground war, the government was forced to call for a ceasefire (Kumar 2000). Ironically, the Internet, the baby of the American military, was able to undermine and counter state-organised military operations.

On the other side, the ceasefire took the Zapatistas by surprise (Froehling 1997). The ZLF had counted on making an emphatic statement by taking the battle to Mexico City, but heavy losses forced them to accept the settlement and scuttled their grandiose plans. When their leaders realised that the Mexican government was a tough negotiator, and feared that they might see a scaling down of their demands, the Zapatista army became even more determined to continue their struggle and sought to carry their message to an international audience. To do this, they realised they would have to use alternative modes of communication, and the network of international electronic support which had grown up around this anti-establishment uprising of indigenous Indians proved to be just what they were looking for (Arquilla and Ronfeldt 2001).

News of the continued insurrection mobilised North American activist NGOs to express support for the EZLN's cause, and delegations began flowing into Mexico to establish new links with local civic organisations and to cement those already made online (Froehling 1997). Organisations also began using the Internet to co-ordinate activities such as the organising of human rights caravans to Mexico. International support for the Zapatistas continued to grow steadily online, with 'netizens' sending e-mails petitioning their national governments, soliciting donations, and participating in online discussion groups (Robberson 1995). The Internet campaign soon became an increasingly important component of the Zapatista struggle, as the EZLN knew that in Internet lay their biggest strength. Their charismatic leader, Subcomandante Marcos, was quick to seize on its potential advantages, sending communiqués to activists who posted them on their websites. Attempts by the Mexican government to set up their own websites failed miserably, their lofty turgid prose being no match for the simple, easily understood messages of the network (Russell 2001).

The paradoxical role of the Internet in the Zapatista movement, one of a high-tech medium aiding people barely aware of its existence, has fired the imagination of activists and hacktivists the world over (Arquilla and Ronfeldt 2001). The medium helped the Zapatistas evade the Mexican government's censorship of conventional media, making their views available easily and accessible immediately to a large global audience. In particular, the Internet enhanced the potency of the parallel worldwide media campaign typified most recently during the Arab Spring of 2011, particularly so by making available reports and articles published in difficult-to-access traditional media, as well as eye-witness accounts and reports from the many activists and observers who had flooded into Chiapas (Cleaver 1998). In this respect, the Internet did make a significant contribution towards keeping the conflict firmly in the spotlight and in making it easier for the news networks to monitor the conflict, which, in turn, indirectly pressured the Mexican government to the negotiating table.

The online campaign drew together local and international actors, who organised and co-ordinated their activities online and as a result could put immense pressure on policymakers both within and outside Mexico (Martinez-Torres 2001). Whilst the networks in support for the movement themselves didn't come out of nowhere—existing networks opposed to NAFTA were already active online and generating large amount of cross-border interaction between North American and Mexican

NGOs—an important (some would say necessary) factor appears to be personal, physical contacts built between members of the network, as a means of engendering trust and cementing relationships established online (Arquilla and Ronfeldt 2001), illustrating the opinion of several social commentators that electronic communications can succeed best to mobilise activists who have already met in person (O'Brien 2002). The series of conferences, continental and intercontinental, and mass meetings that took place between the Zapatistas and other social movements linked to them aimed at the discussion of the issues related to and surrounding global capitalism, and the forging of new links between groups with otherwise little or no contact was perhaps the most dramatic organisational achievement that Internet had on the Zapatista cause (Cleaver 1998).

That said, it is important to note that whilst the Internet was used by Mexican civil society to form a sustainable network of support for the Zapatistas, the EZLN itself played no direct role in the proliferation of its use (Russell 2001). Information on the movement didn't emanate from a single Zapatista-controlled site; instead it came from multiple websites hosted around the world, and, contrary to popular myth, Subcomandante Marcos did not (and still doesn't) sit in the Mexican jungle with his laptop uploading EZLN communiqués. At the same time, these internationally managed websites form an important means of taking the Zapatista's message beyond the borders of Mexico (Arquilla and Ronfeldt 2001). The price the Zapatistas had to pay for their digital enthusiasm came in the form of a loss of focus from their original aims over a short period of time. As the online networks grew, the campaign transformed from one focused, centralised effort by a guerrilla army to a more decentralised, scattered action against neoliberalism, peace, and indigenous peoples' rights. The emphasis placed on the personality cult of Subcomandante Marcos, whilst yielding benefits by way of making him and the Zapatista movement a *cause celebre* internationally, also worked to divert attention from the Zapatista's original message (Cleaver 1998). Critics of the Internet and its application to civil society are of the opinion that this has partly to do with the inherent weakness of the medium itself and its tendency to overload the user with information (Froehling 1997).

Despite the drawbacks, however, the operations of the international solidarity networks formed as a direct result of the Zapatista uprising demonstrated that the Internet and related information and communication technologies can have an impact on, and forge connections between, the lives of people who are not otherwise directly linked to each other across the world. They also showed civil society groups the way in which the digital technologies can allow a network to escape hierarchical control and might be used to play an important role in adding a new, often global dimension, to a local struggle (Froehling 1997).

5.2 The Multilateral Agreement on Investment

The tale of the MAI opens against the backdrop of deepening global economic integration, particularly between developed nation states, in the latter part of the twentieth century. An outpouring of foreign direct investment (FDI) from these countries,

beginning in the late 1980s and continuing up to the present day, highlighted the need to develop a standard set of multilateral rules governing investment policies (Kobrin 2012). At the 1995 G7 summit, the task of negotiating a multilateral framework for investment under the auspices of the Organisation for Economic Co-operation and Development (OECD) was endorsed in the final communiqué titled the Multilateral Agreement on Investment or the MAI (Deibert 2000).

The proposed MAI aimed at solving the problems created by unilateral government restrictions and regulations on FDI by putting forth a framework to protect such investments, to encourage international liberalisation, and to provide an effective global dispute mechanism (Neumayer 1999). The treaty was to be free-standing, open first to OECD and European Economic Community members, and to be extended later to non-OECD members worldwide. Proponents of the MAI believed that the treaty would give a boost to liberalisation and FDI by providing international regulators with a clear set of rules to govern and a mechanism for their uniform application. Nation states would simply have to ensure that their legislation wasn't biased against foreign (as opposed to domestic investment (Deibert 2000).

The central themes of opposition to the MAI after its proposal and enforcement focused on issues related to reduced state sovereignty and to the unbridled growth of global corporate power. Its critics saw the agreement as an extension of 'global economic neoliberalism', where big business and transnational capital interests were pursued at the expense of the environment, labour rights, and culture (Neumayer 1999). Critics believed it gave far too many political rights to corporations—fears that were exacerbated when a chemical company called Ethyl Corporation sued the Canadian government and won a $13 million settlement—and felt that it was 'the intention of the MAI not to regulate investments but to regulate governments' (Joint NGO Statement on the MAI to the Organisation for Economic Co-operation and Development, NGO/OECD Consultation 1997). It was these fears, coupled with the widespread perception that the negotiations for the MAI were being conducted in secret, that focused attention on the central issue of the need to amend the treaty and which brought together groups of diverse interests (Kobrin 1998).

The OECD negotiations didn't finish in early 1997 as previously scheduled, and activists launched an online campaign against the MAI soon after a draft copy of the agreement found its way onto the Internet later that year (The OECD 1997). Protesters hoped to set up a large-scale and sustainable campaign against the treaty, and their hopes were borne out when the effective use of the Internet by civil society organisations resulted in 'a tidal wave of electronically amplified public opposition to the MAI', and by mid-1998, it was clear that the MAI was in trouble (Kobrin 1998). Negotiations collapsed completely when the French government backed out in October that year.

The anti-MAI campaign used the Internet in three basic ways. First and foremost, the Internet became a medium of swift, virtually instantaneous communication between the various members of the campaign network. Individuals and organisations spread out across the world took advantage of e-mail lists to keep abreast of the ongoing negotiations, campaign meetings, recent literature, news, and other relevant information (Smith and Smythe 1999). Lists that had the largest

number of e-mail addresses and whose members sent the largest volume of e-mails and updates included STOP-MAI (Australia), MAI-Not (USA), and MAI-Not (Canada). An additional benefit, according to some commentators, was that the enhanced co-ordination that resulted from the use of e-mail helped in fostering a greater sense of cohesiveness between the various groups involved in the campaign, which ultimately resulted in its success (Deibert 2000).

Activists also used the Internet to publicise information on MAI and, more importantly, put across their interpretations and analyses of events to a global audience (Smith and Smythe 1999). Websites, particularly those of the leading organisations such as the Council of Canadians and Preamble Collaborative, published articles and essays, analyses, interpretations, and updates online and offered users a whole host of cross-references and links to related sites and sites belonging to other members of the network (Kobrin 1998). And finally, the Internet was also used as a tool to put direct pressure on politicians and policymakers from the nation states involved in the negotiations. This was done through the listing official e-mail addresses on websites, the posting of sample petition letters, and through the provision of a downloadable list of politicians' meetings that could be picketed.

The above discussion suggests that digital technology formed an integral part of the anti-MAI campaign. But how useful was it really in bringing about an end to the negotiations? All evidence points to the fact that the campaign drew participants particularly from countries with a long tradition of anticorporate social activism and that even without the Internet, there would have been some kind of significant opposition to the MAI (Deibert 2000). Some commentators believe that, given the composition of the campaigners, the negotiations would have collapsed regardless of the presence of any Internet-based activism or enhanced communication through digital networking. Further, some national differences, particularly those regarding culture, were too deep to resolve, and commentators point out that it was the French withdrawal that ultimately put paid to the MAI negotiations and not any form of any organised digital protest.

The two case studies discussed above demonstrate the ways in which the Internet has impacted civil society movements, boosting the speed and capability to organise their internal flexibility and their international reach. The Internet and the new information and communication technologies allowed people from around the world to pool their resources, knowledge, and expertise in order to mount vigorous transnational campaigns. A close examination suggests that arguments about the Internet being 'an unsustainable platform for citizen activists' are largely misplaced and that although the survival of such networks will admittedly depend primarily on their human element, the Internet has, however, become an indispensable tool in the opening up of the world and as a new means of instigating social change through civil society networking. Although in neither case has the campaign seen a complete victory—it is possible that the Mexican government will continue its repression in Chiapas and more than likely that the MAI will reappear on the agenda in a different guise in the years to come—the networks formed in the late 1990s have not disappeared and have, in fact, gained in strength over the past few years with the turn of the new century.

6 Conclusions: The Future of the Internet

> The world at large is exactly what is at stake. Geographical borders seem to be of no importance whatsoever to the new media—they simply haven't been invited to the global ICT party.
>
> Sarai Report to The Waag[1]

Never before in history has any invention shot from obscurity to global fame in the way the Internet has. Never before has any new technology given us a peek into the future in quite the same way: a peek into a highly interconnected world where the cost of transmitting and accessing an infinite amount of information is reduced to virtually nothing, where physical boundaries are no longer limits to human action, and constrained physical space is replaced by a virtual 'cyberspace' which is not subject to traditional hierarchies and power relations, and where there is place for all regardless of sex, nationality, ethnicity, or religion. In short, the Internet promises a rapid movement towards a just and prosperous world and the development of a truly global civil society.

At the same time, there are roadblocks to be overcome if the Internet is to deliver on its promises. Contrary to the claims of 'cyber romantics', equality and empowerment are not inevitable consequences of the use of technology. The present bias of the Internet towards the West, with the predominance of English as the major *lingua franca* online, reinforces the existing digital divide and reflects the lopsided power relationships in contemporary world politics. This imbalance is a formidable barrier to a truly global civil society, and there is no guarantee that it will be rectified in the near future. Furthermore, issues of Internet regulation and security have, particularly after its effective use by terrorist networks such as al-Qaeda, become hotly debated issues.

In the Information Age, societies are interconnected. The days of closed-door negotiations and secret repression are drawing to an end. As both the Mexican government and the OECD found out the hard way, the digital technology has empowered those NGOs and advocacy groups that have embraced the Internet and are now electronically networked across borders. Information technology has become, and looks set to remain, a critical ingredient of networking activity in today's world. Civil society networks, buttressed by the power of the Internet and digital platforms, can defy existing boundaries. We can no longer remain isolated from the networks of power and resistance that envelop our interconnected world.

Transnational movements of the twenty-first century have recognised this and are increasingly expanding their presence on the Internet. From the more traditional movements such as the labour movement to more recent ones such as the Campaign against Climate Change, there is a growing acknowledgement of the Internet's dynamism and versatility and its advantages as a medium of communication. The ease with which information can be exchanged and fluency of the logistics

[1] Quoted in Mark Surman and Katherine Reilly, Appropriating the Internet for Social Change: Towards the Strategic Use of Networked Technologies by Transnational Civil Society Organisations, Social Science Research Council Report, November 2003, p. .

planned between partners thousands of miles apart promises new opportunities for vigorous coalition-building and other similar activist activities. The Internet is also an increasingly important tool for facilitating and cementing the social relations that serve as the basis for global civil society.

The contemporary world is in the midst of a historical change. The Information Age has given way today to new powers and new responsibilities and to a whole host of actors who, through embracing the Internet and digital technologies, are fast becoming central to the new, electronically networked civil society. Whilst Internet access in the developed world far outstrips that of the developing world, predictions for the growth in the number of users are phenomenal, and the potential of the Internet as a weapon to combat underdevelopment and inequality in the future is immense. The Internet today, therefore, constitutes a significant part of sociopolitical interactions and will continue to play an increasingly important role in the shaping of world politics in the years to come.

References

Abbate, J. (2001). Government, business, and the making of the internet. *Business History Review, 75*(1), 147–176.

Arquilla, J., & Ronfeldt, D. (2001). *Networks and netwars: The future of terror, crime, and militancy*. Santa Monica: RAND.

Castells, M. (1996). *The information age: Economy, society and culture: Vol. 1—The rise of the network society*. Oxford, England: Blackwell.

Castells, M. (2001). *The internet galaxy: Reflections on the internet, business and society*. Oxford, England: Oxford University Press.

Chandrasekaran, R., & Corcoran, E. (1997). Human errors block e-mail, web sites in internet failure: Garbled Address Files From Va. Firm Blamed. *The Washington Post*, July 18, p. A1.

Cleaver, H. M., Jr. (1998). The Zapatista effect: The internet and the rise of an alternative political fabric. *Journal of International Affairs, 51*(2), 621–640.

Danitz, T., & Stobel, W. P. (2001). Networking dissent: Cyber activists use the internet to promote democracy in Burma. In J. Arquilla & D. Ronfeldt (Eds.), *Networks and netwars: The future of terror, crime, and militancy* (pp. 129–170). Santa Monica: RAND.

de Armond, P. (2001). Netwar in the Emerald city: WTO protest strategy and tactics. In J. Arquilla & D. Ronfeldt (Eds.), *Networks and netwars: The future of terror, crime, and militancy* (pp. 201–238). Santa Monica: RAND.

Deibert, R. J. (2000). International Plug 'n play?: Citizen activism, the internet and global public policy. *International Studies Perspectives, 1*, 255–272.

Denning, D. E. (2001). Activism, hacktivism and cyberterrorism: The internet as a tool for influencing foreign policy. In J. Arquilla & D. Ronfeldt (Eds.), *Networks and netwars: The future of crime, terrorism and militancy* (pp. 171–199). Santa Monica: RAND.

Fenton, N. (2007). Contesting global capital, new media, solidarity and the role of a social imaginary. In B. Cammaerts & N. Carpentier (Eds.), *Reclaiming the media*. Brussels, Belgium: ECREA Series-Intellect.

Frangonikolopoulos, C. A. (2012). Global civil society and deliberation in the digital age. *International Journal of Electronic Governance, 5*(1), 11–23.

Froehling, O. (1997). The cyberspace war of 'Ink and Internet' in Chiapas, Mexico. *Geographical Review, 87*(2), 291–307.

Gilbreth, C., & Otero, G. (2001). Democratisation in Mexico: The Zapatista uprising and civil society. *Latin American Perspectives, 28*(4), 7–29.
Gilder, G. (1999). The Faith of a futurist. *Wall Street Journal, 31*.
Harwood P.G., Celeste, L.J. (2001). Surfing alone: The internet as a facilitator of social and political capital? Paper prepared for delivery at the 2001 Annual Meeting of American Political Science Association, Aug–Sept. 2001.
Huysman, M., & Wulf, V. (2004). *Social capital and information technology*. Cambridge, MA: MIT.
Internet World Stats (2012). Available at: http://www.internetworldstats.com/
Joint NGO Statement on the Multilateral Agreement on Investment (MAI) to the Organisation for Economic Cooperation and Development, NGO/OECD Consultation (1997). Delivered in Paris on 27 October, 1997. Retrieved October 2, 2013, from http://bocs.hu/igaz-a-1.htm
Jordan, T., & Taylor, P. A. (2004). *Hacktivism and cyberwars: Rebels with a cause?* London: Routledge.
Juris, J. S. (2005). The new digital media and activist networking within anti-corporate globalization movements. *The ANNALS of the American Academy of Political and Social Science, 597*, 189–208.
Kalathil, S., & Boas, T. C. (2010). *Open networks, closed regimes: The impact of the internet on authoritarian rule*. Washington, DC: Carnegie Endowment.
Kobrin, S. J. (1998). The MAI and the clash of globalisations. *Foreign Policy, 112*, 97–109.
Kobrin, S. J. (2012). *The multilateral agreement on investment* (The Wiley-Blackwell encyclopedia of globalisation). London: Blackwell.
Krause, A., Stein, M., Clark, J., Chen, T., Li, J., Dimon, J., Kanouse, J., & Herschman, J. (2006). The virtual activist 2.0: A training guide. NetAction.Org. Retrieved October 1, 2013, from http://www.netaction.org/training/v-training.html
Kumar, C. (2000). Transnational networks and campaigns for democracy. In A. M. Florini (Ed.), *The third force: The rise of transnational civil society* (pp. 115–142). Washington, DC: Carnegie Endowment for International Peace.
Martinez-Torres, M. E. (2001). Civil society, the internet, and the Zapatistas. *Peace Review: A Journal of Social Justice, 13*(3), 347–355.
Mora, M. (2008). Zapatista anti-capitalist politics and the "Other Campaign": Learning from the struggle for indigenous rights and autonomy. In R. Stahler-Sholk, H. E. Vanden, & G. D. Kuecker (Eds.), *Latin American social movements in the twentieth century; resistance, power, and democracy* (pp. 151–164). Lanham, MD: Rowman & Littlefield.
Neumayer, E. (1999). Multilateral agreement on investment: Lessons for the WTO from the failed OECD negotiations. *Wirtschaftspolitische Blätter, 46*(6), 618–628.
Norris, P. (2001). *Digital divide: Civic engagement, information poverty, and the internet*. Cambridge, England: Cambridge University Press.
O'Brien, R. (2002). Global civil society networks online: Zapatistas, the MAI and landmines. May 2002. Retrieved October 2, 2013, from http://www.web.net/~robrien/papers/civsocnets.html#_Toc535832619
Robberson, T. (1995). Mexican rebels using a high tech weapon. *Washington Post*, 20 Feb 2005, p. A1.
Russell, A. (2001). The Zapatistas and computer-mediated peace. *Peace Review: A Journal of Social Justice, 13*(3), 357–363.
Smith, P., & Smythe, E. (1999). Globalization, citizenship and technology: The MAI meets the internet. *Canadian Foreign Policy, 7*(2), 83–105.
The OECD. (1997). *Towards a global information society—Global information infrastructure, global information society: Policy requirements*. Paris: Organisation for Economic Cooperation and Development.
Van Laer, J., & Van Aelst, P. (2010). Internet and social movement action repertoires. *Information, Communication & Society, 13*(8), 1146–1171.

Virkar, S. (2014). *Re-engaging the public in the digital age: e-consultation initiatives in the Government 2.0 landscape* (Encyclopedia of information science and technology 3rd ed.). Hershey, PA: IGI Global.

Virkar, S. (2014). Consulting the British public in the Digital Age: Emerging synergies and tensions in the Government 2.0 Landscape. In L. Anthopoulos & C. G. Reddick (Eds.), *Government e-strategic planning and management: Practices, planning, and roadmaps*. New York: Springer.

Wall, M. A. (2007). Social movements and email: Expressions of online identity in the globalization protests. *New Media Society, 9*(2), 258–277.

Wartenkin, C. (2001). *Reshaping world politics: NGOs, the internet and global civil society*. Lanham, MD: Rowman & Littlefield.

Zinnbauer, D. (2001). Internet, civil society and global governance: The neglected political dimension of the digital divide. *Information and Security: An International Journal, 7*, 45–64.

Chapter 4
Ensuring Participatory Design Through Free, Prior and Informed Consent: A Tale of Indigenous Knowledge Management System

Tariq Zaman and Alvin Yeo Wee

1 Introduction

Information and communication technologies (ICTs) for development is a growing field of study. There has also been an increasing interest in how access to ICT, such as connecting to the Internet, might impact social and economic development by, for example, giving access to unlimited knowledge (e.g. e-learning), providing health-related services (telediagnosis) and offering businesses opportunities (e-commerce), employment opportunities and access to government services (e-Government websites) (Siew et al. 2013). In all such development projects, two critical success factors are the degree of the users' satisfaction of the technology and the degree to which the services offered by the technology address the primary needs of intended beneficiaries (Dearden 2008).

Over the past two decades and with the evolving concepts of indigenous knowledge management (IKM), researchers, development organisations and even indigenous communities are exploring digital technology and techniques to codify and improve access to indigenous knowledge (IK) (Dyson et al. 2007; Holland and Smith 2000). ICTs provide many opportunities to codify and make explicit non-codified tacit knowledge and then disseminate it through various forms of expression such as pictures, audio and videos. There are many examples of using ICTs for revitalization of indigenous languages and preservation of cultures and knowledge (Winschiers-Theophilus et al. 2013a, b).

Most ICTs for IKM are designed and implemented without making distinction between the end users (urban and rural) of the system. These technologies would not work given that the target communities of urban and rural dwellers are very much different. These differences include the rural–urban context, literacy, language

T. Zaman (✉) • A.Y. Wee
Institute of Social Informatics and Technological Innovations-Center of Excellence for Rural Informatics (ISITI-CoERI), Universiti Malaysia Sarawak (UNIMAS), Sarawak, Malaysia
e-mail: zamantariq@gmail.com

S. Saeed (ed.), *User-Centric Technology Design for Nonprofit and Civic Engagements*, Public Administration and Information Technology 6, DOI 10.1007/978-3-319-05963-1_4,

and prior experience with computers (Saeed et al. 2008). Hence, the literature is littered with failures and short-term successes of these systems. One of the factors, in failure of technology appropriation, is the absence of input from local culture and community in the design of the system (Winschiers-Theophilus 2009). The indigenous communities have their own concepts of knowledge and forms of information communication, so it is necessary that they should be able to develop their ICTs usage in such a way that their cultural identity should not come under stake (Zaman et al. 2010).

In this chapter, first we will discuss the challenges of using ICTs for indigenous knowledge management systems (IKMS) and the concepts and levels of users' participation in designing, developing and implementation of IKMS. In second part, we will present introduction of the research project and research site and in third part we will describe in detail the proposed framework that is used to ensure the community's active participation in designing, developing and implementation of the eToro project. In last part of the chapter we will discuss the lesson learnt and summary.

2 The Challenges of Using ICTs for IKMS

Researchers highlighted the challenges that technology can bring; instead of a silver bullet solution to cultural preservation, ICTs can be a double-edged sword for indigenous communities. Velden highlights how the expectations from digital tools such as database software for IKM are very high (Velden 2010). Oppenneer warns that the use of ICTs for IKM can bring in a "computer-mediated colonialism" (Oppenneer 2010). He also argues that Western cultural values, which are embedded within the technology, can dominate the values, social and cultural systems and communicative preferences of indigenous peoples. According to Winschiers-Theophilus, there is a need for a major shift in the traditional Western conceptual framework of technology design for IKMS (Winschiers-Theophilus et al. 2012). The Western science paradigm should move beyond the approach of validating and integrating IK and towards embracing knowledge co-design and co-production in bringing researchers, scientists and indigenous knowledge holders together on an equitable and mutually respectful basis.

2.1 The Concept of Participation

The debate on the failures of ICT4D project implementations has brought to the limelight the concept of participation. An active participation process engages participants in all stages of a given activity, from identification of problem to decision making of activities and outcomes. In information systems the terms "participation" and "involvement" are normally used interchangeably with few exceptions. Barki advises that in ICT-related fields, activities relating to beliefs of personal

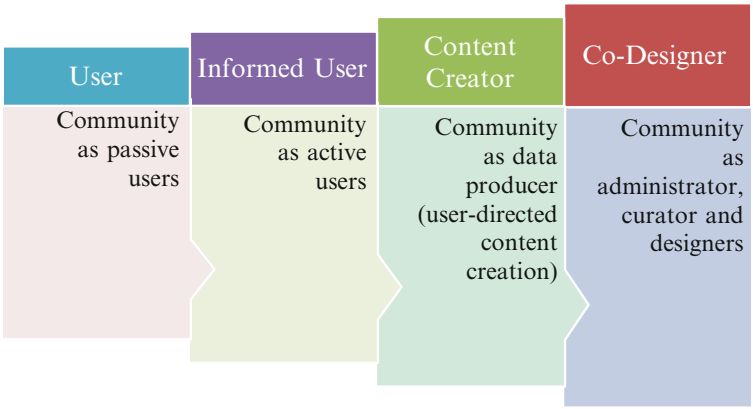


Fig. 4.1 Levels of community engagement in the system development

relevance attached to an activity should be referred to as involvement while as the term participation should be left to refer to assignments, activities and behaviours performed within the cycle and period of an information system implementation inclusive of system development process (Barki and Hartwick 1989). This assertion suggests that it is actually involvement that encourages participation since people realise the importance and perceived usefulness of the intervention when they are involved (Barki and Hartwick 1994).

2.2 Levels of Users' Participation in Designing, Developing and Implementation of IKMS

According to Holland (2002), the Digital Collectives in Indigenous Cultures and Communities meeting in Hawaii brought together cultural leaders, digital library researchers and builders and representatives from institutions of cultural memory and funding agencies, to discuss the way digital technology might be used so that the cultures of indigenous communities could be preserved and public perception of these communities improved. The recommendations from the meeting include the participation of community leadership and elders, respect of their cultural values and their right to decide the degree of their participation in information technology plans related to digital collectives (Holland 2002). The ideal situation in the case of ICT-based IKMS would be a process in which the indigenous community actively participates in each step of system development life cycle. In Fig. 4.1, we show four possible levels of community engagement in system development, which range from "User" (least engaged) to "Co-Designer" (most engaged).

At the "User" level, the community has most limited role and merely receives access to the ICT-based IKMS. They have no participation before, during or after system design and development. Hence they become passive users of the system,

which may be designed upon concepts foreign to their culture. At the "Informed User" level, the community is not involved in the system design and development but they are "informed as users" at the implementation stage of project and trained as users of the ICT-based IKMS. At the "Contents Creator" level, the community participates in collecting and producing data to populate the ICT-based IKMS. Hence their role is limited to the level of making their tacit knowledge explicit with the help of technology and digital tools. In this case, modern intellectual property laws do not consider them to be "writers" of the produced content. As such, they cannot claim the copyrights of their knowledge. At the "Co-Designer" level, the community is involved as "co-designers" in the system development and implementation phases and has a role in every decision related to their knowledge resources. In addition, members of the community are considered both curators and designers of the system; they can proclaim legal rights to intellectual property within the IKMS.

3 Background

3.1 Research Site

The research is conducted in a remote village Long Lamai of East Malaysia. Long Lamai is one of the biggest and oldest settlements of Penan in upper Baram, Miri Sarawak. The village is only reachable by flying from Miri to Long Banga and taking a one-and-half hour boat ride to Long Lamai. Alternately, one can drive 8 h along logging roads and hike an hour through dense forest. There are approximately 450 Penans living in Long Lamai (Winschiers-Theophilus et al. 2013b). All of them are Christians. Most of the community (92 %) are farmers. With exception of Irau Ajaú, or the harvesting festival, the community does not presently celebrate other cultural or social festivals. The community is egalitarian in nature and strong community bonding is reflected in their daily activities and interactions. The village is a true picture of a remote community and digital divide with no road access, no electricity, no proper water supply and no telecommunication connectivity. The available infrastructures at Long Lamai consist of a Penan school, a church and a telecentre, Ngerabit eLamai. Ngerabit eLamai is one of the eBario replication sites under the UNIMAS research partnership (Zaman et al. 2011). The only source of telecommunication at the village is the telecentre. It is equipped with three networked PCs, three laptops, a printer and a scanner. The telecentre also provides other facilities such as telephone connection, the Internet, printing and photocopying services.

3.2 Research Project

The rapid change in the Penans' way of life has largely accounted for the loss of their indigenous knowledge (IK). The eToro project is an integral indigenous knowledge (IK) management system that has been led by Universiti Malaysia Sarawak

(UNIMAS) in collaboration with the Penan community of Long Lamai, Sarawak. In this project, ICT and mobile technology are being used to collect, curate and disseminate traditional botanical knowledge, intending to preserve and pass it on to their young, as well as facilitating claims for intellectual property rights. This includes an assimilative use of technology together with a cultural protocol whereby the community retains control and rights of access to their own data which are protected by innovative approaches to intellectual property rights for the community.

Existing systems tend to take a product view of knowledge management, focussing mainly on explication of tacit knowledge with control at the hands of global players and limited control of intellectual property by the community themselves. Furthermore the knowledge acquisition is performed in isolation of the social structures and indigenous cultural systems. The proposed approach involved the community actively through the entire software process starting from requirements analysis and design even up till the evaluation and testing stages. The outcome of our project has been beyond our expectation, as it has turned out to become the one and only indigenous wisdom facilitation system powered by a well-thought-of knowledge governance framework.

4 A Model for Ensuring Community's Active Participation in Systems Development

Based on a very comprehensive meta-analysis of the previous researches on community's participation in IKMS, we developed a framework to ensure the community's active participation in systems development. The framework indicates the multidimensional nature of the concept of participation in systems development at two levels: firstly, at activities organisation level and secondly, at data organisational level (Fig. 4.2).

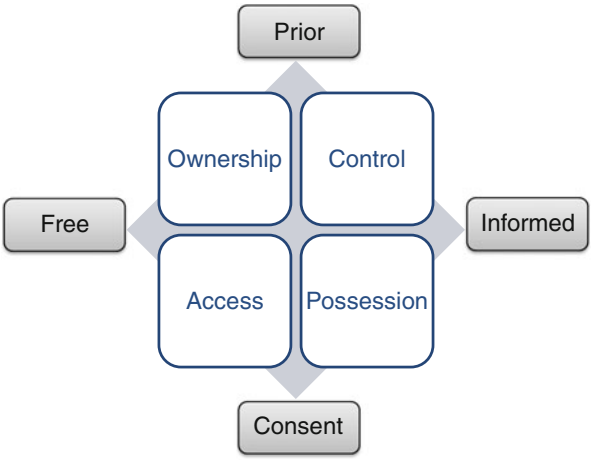


Fig. 4.2 Framework for community's active participation in systems development

4.1 Activities Organisation Level

To ensure the community's active participation in decision making at project activities organisation level we used Free, Prior and Informed Consent (FP&IC) tool. FP&IC is an internationally recognised tool to ensure active community participation and engagement in any project related to indigenous communities. The main intention behind FP&IC is that the knowledge bearers (the local community) agree to be active partners in any activities related to their resources including IK (Shrumm and Jonas 2012). FP&IC principles comprise four conditions, all of which must be met before the consent of indigenous peoples can be regarded as free, prior and informed (Porsanger et al. 2011). Under FP&IC, consent must (1) be granted freely, (2) be granted in advance (prior to initiation), (3) be granted on an informed basis and (4) be regarded as consent, not an agreement or contract (unless mentioned explicitly). The research agreements should base on FP&IC principle and should cover the details related to the project such as implementation plan, benefits and the roles and rights of each partner of the project. As outlined, community capacity building and engagement is critical to the success of ICT-based IKM. However, while literature on existing approaches discusses outcomes or technical solutions to IKM, it does not describe the procedure for how the community engagement processes have been or should be conducted. Designing and implementing FP&IC agreement with community's active participation is a solution to this problem.

In eToro project implementation activities are divided in to three parts: data collection, developing ICT tools and conducting trainings. The researchers from UNIMAS developed the ICT tools for data collection, and provided necessary hardware and training to the community while the community elders identified the plants and youth participated in recording of the elders' knowledge about plants (Zaman et al. 2013). The details of the project's activities, benefit sharing and responsibilities are thoroughly discussed in FP&IC agreement (Appendix) of the eToro project.

4.2 Data Organisation Level

After collection of IK, where the data will be stored and how it is protected from unauthorised users are the concerns that need to be addressed with the consent of the community. Many international, regional and national archives apply web-based storage (ex situ) solutions for data storage. Few researchers advocate for the storage of collected resources in local repositories and the placement in community centres where collections can be easily accessible and integrated into the existing knowledge management systems (Goswami and Basu 2011). According to Dyson and Leggett (2006), the ICTs' design for IKM should be based on indigenous community protocols, security concerns over who has access to secret or sacred knowledge and intellectual property issues. Researchers should work together with community members to explore how local needs, communication norms, access and security concerns can be addressed with the appropriate digital tools. The Ownership,

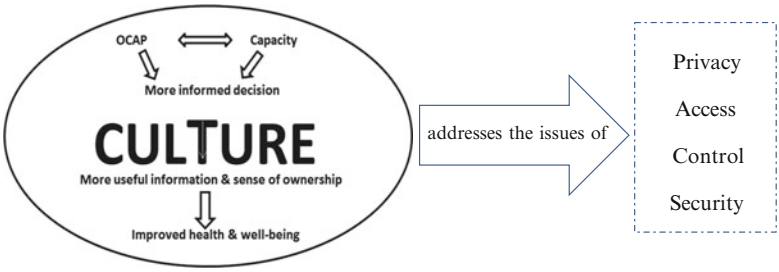


Fig. 4.3 OCAP framework and addressed issues—adapted from First Nations Centre (2007)

Control, Access and Possession (OCAP) is another instrument that we used to ensure the community's active participation at data organisation level in eToro project. The OCAP principle guidelines and framework (Fig. 4.3) are introduced in Canadian First Nations for initiative to govern and control health data in the Regional Longitudinal Health Survey. The OCAP guidelines are developed by the Ottawa-based First Nations Information Governance Centre. The guidelines provide a way for community involved in research partnerships to make decisions regarding what research will be conducted, for what purpose data will be used and shared, where data will be physically stored and who will have access to it (First Nations Centre 2007).

In eToro project, we embedded OCAP principles in FP&IC agreement of the project and ensured that the community is well aware, informed and has agreed with the local research agenda regarding what kinds of data are needed, how that data can best be obtained, about ownership of data and how application of research findings can add value to local governance initiatives. One of the strong features of OCAP is that it also provides guidelines to researchers on how to engage a community in project planning and implementation. On the other hand, it is only limited to data and information governance when the knowledge takes explicit or codified forms.

5 Discussion

Our experience of developing eToro projects shows that developing systems with and for indigenous and rural communities is full of unique experiences. The users of the systems are with limited literacy, little prior experience with computers and not familiar with the technical concepts of computing. On the other side the researchers are from urban settings which are novice in rural settings. Hence there is a need of culturally appropriate intensive community engagement, dealing with issues such as intra-community diversity, power relationships and expectations on both sides (researchers as well as community side). One of the ways is to empower the community leadership, key informants and local champions to understand the basic concepts and decide about the structures of activities and data management before engaging directly with community members. Without the support from local

community elders, the community members are often unwilling to participate or do not trust the new arrivals. The second option is to work through the existing established relationships such as through the researchers that are already working in that specific community. It is very common that outsiders coming with big promise may or may not be able to convert it into practical actions in the longer term. The success of technological solutions is more suspicious for them because it carries both benefits and risks, and very vulnerable communities may not be ready to afford those risks (Kitner et al. 2006).

For designing eToro and from the researchers' perspective, a series of formalised methodology was used in this project. These are as follows: (1) Designing process flow diagrams: For understanding processes, roles, actions and rights of stakeholders. (2) Developing cultural protocols (FP&IC agreement and guidelines): For community, researchers and data engagement. (3) Designing data instruments: For eliciting community needs and acquisition of IKMS. (4) Developing prototypes for IKMS: For digital data collection and indigenous content management; the formats of the data (text, video, sound, images). (5) Capacity building program: For participatory digital data (PDD) collection and processing. Our designed tools have become powerful knowledge acquisition systems in context, with communities contributing and managing their knowledge in full confidence, to maximally create value from intangible assets. Initial exploration has opened up numerous potentially enriching partnerships and pioneering projects with unique selling point. Beyond the system developed, the approach used in modelling knowledge through a systematic capture-in-context methodology is in itself a major contribution. Replication to another community has been carried out and has many opportunities to be employed with other indigenous communities worldwide.

6 Summary

The experiences with eToro have given rise to the concept of ICTs for indigenised development, in which the core characteristics of community-owned ICTs lend themselves well to solution for many of the problems that the world's indigenous people share. By empowering them to design appropriate ICTs, they are able to put them to use within development activities of their own choice, as opposed to those that are imposed harmfully from outside and which often assume absorption of minority cultures into mainstream society.

The close engagement between the research team and the community has resulted in the following: (1) project that is firmly embedded in the problems, aspirations and opportunities that the community itself identifies; (2) community capacity building to design appropriate technologies; and (3) a trainable methodology for community-based research. The project produced a database of 50 plants, software tools and cultural protocols and guidelines for ICT researchers and community members.

Appendix: Free, Prior and Informed Consent Certificate and Research Agreement

eToro: Indigenous Botanical Knowledge Gathering, Documenting and Dissemination in Long Lamai, Sarawak

Thursday, March 01, 2012

Institute of Social Informatics and Technological Innovations-Center of Excellence for Rural Informatics (ISITI-CoERI) UNIMAS and Long Lamai community, upper Baram, Miri Sarawak, agree to conduct the named research project with the following understandings:

Introduction

1. The purpose of this research project, as discussed with and understood in the community of Long Lamai, upper Baram, Miri Sarawak, is to gather, document and disseminate Penan Indigenous Botanical Knowledge.

Scope

2. The scope of this research project, as discussed with and understood in this community, is the initial partnership between ISITI-CoERI from UNIMAS and Ngerabit eLamai (Telecentre) from Long Lamai community. ISITI-CoERI will assist the Ngerabit eLamai and Long Lamai community by developing ICT-based data collection and content management systems, training for digital data collection and processing and priding the scientific names of the identified botanical plants. Ngerabit eLamai will provide the services of the telecentre. The Long Lamai community will arrange activities and provide potential local human resource for training, data collection and IK database management.

Structure of the Project: Roles and Actions

3. The development of this project is based on sincere communication between community members and researchers. All efforts will be made to incorporate and address local concerns and recommendations at each step of the project.

Training, Data Collection and Content Management

4. The methods for training, data collection and content management to be used, as agreed by the researchers and the community, are:

   (a) Community training and participation, as agreed, are to include PDD collection and processing.

   The process of PDD collection and processing is, in essence, extremely simple, and the equipment required is increasingly widely available and affordable. This is the way the process works:

- The community will provide human resource for data collection.
- The community will learn how to use digital equipment through games and exercises facilitated by outsiders.
- The elders of the community will identify and analyse potential knowledge assets and practices in their community.
- The facilitators will help in designing and developing suitable digital media to manage the knowledge resources.
- The content messages are collected and processed by the local groups.
- The contents are shown to the wider community.
- The contents would be uploaded to secured database.

(b) The process of data collection about the plants to be led by the community members (elders and youth).
(c) The Process of Content Management, as agreed, are to include:

- The proposed database would base on the needs of the community. The database will contain information of indigenous medicinal plants which the community uses in daily life. Information includes taxonomic data on identified plant, including indigenous names and nomenclature, as well as their local traditional use. Scientific names of the plants are also part of the database. The database entries are complemented by geographical references, based on satellite localisation of areas where materials have been collected. Voice, videos and digital images also form part of the database.
- As demanded by the community the database would be a "closed" system, and will not make Penan IK publicly available. The data would be generally considered as confidential and conserved with e-instu concept while governed by the local customary laws. To get the scientific names for plants, the pictures of the plants will be provided to botanist.

Data and Information Management

5. Data and information collected is to be shared, distributed and stored in these agreed ways:

(a) The data collected about the plants is confidential and will be kept secured. All the processing on the plants' data will be held in Ngerabit eLamai Telecentre where the data will be uploaded to the content management system from data collection devices. The processed data will be kept on external drives and under the custody of IK manager (a community member) who will be selected by the community. The researchers and eLamai will be available to answer questions and assist community members. A final report will be distributed after approval from the community members.
(b) Each party will be the owner of the data that is created and/or developed by them and the other party is subject to use license conditions determined by the community and need to obtain permissions for the use of and storage of

that data. ISITI-CoERI will have the right to copyright and replicate the process, data collection software and content management system, while the data collected about the plants will be in sole ownership/stewardship (and *molong*) of Long Lamai community.

6. The research publication, reports and other relevant documents will be translated into the language of the community.
7. Before distribution of the final report with any third party the community will be consulted once again as to whether the community agrees to share this data in that particular way.
8. At the end of the project, the researchers will participate in community meetings to discuss the results of the analysis with community members.

Funding, Benefits and Commitments

Funding

9. The main researchers have received funding and other forms of support for this research project from UNIMAS.
10. The funding agency has imposed the following criteria, disclosures, limitations and reporting responsibilities on the main researchers.
    (a) To submit a biannually comprehensive report.
    (b) At least five research publications and one conference presentation.

Benefits

11. The benefits likely to be gained by the community through this research project are:
    (a) To preserve Penan's Indigenous Botanical Knowledge which is at risk of disappearing or being eroded.
    (b) To strengthen the IKMS of knowledge transfer within and between age groups.
    (c) To revitalise the indigenous identity through knowledge transferin younger generation.
    (d) To support the maintenance and integrity of indigenous cultures.
    (e) To store and codify the tacit knowledge which could be a way to intellectual property rights on their knowledge assets.
12. The ISITI-CoERI objectives of the projects are:
    (a) To devise possible mechanisms for secured protection, and preservation of IK, through community initiatives.
    (b) To collaboratively develop an effective and appropriate means of recording, storing and managing data and information.

(c) To develop a *sui generis* database protection.
(d) To develop the capacity of Long Lamai community to record, control, access and use of IK by third parties.

13. The main researchers wish to use this research project for their benefit in the following ways:

(a) For fulfilment of PhD, to design and experiment.
(b) To test the Indigenous Knowledge Governance Framework on eToro case study.

14. The researchers will submit a final report to the funding agency at the end of the project. Scientific presentations in peer-reviewed publications and conferences will be made. The final report will be reviewed by community members prior to publication. Scientific presentations will be made and articles published after discussion with the respective community leaders.

Commitments

15. The community's commitment to the researchers is to:

(a) Recommend capable and reliable community members to collaborate in this project.
(b) Keep informed about the progress of the project, and help in leading the project towards meaningful results.
(c) To get skills, run and manage the project in sustainable way even after project completion.

16. The researchers' main commitment to the community is to:

(a) Inform the community about the progress of the project in a clear, specific and timely manner.
(b) Act as a resource to the community on questions related to technicalities of the project.

17. The researchers and community agree to interrupt the research project in the following circumstances:

(a) If community leaders decide to withdraw their participation.
(b) If the researchers believe that the project will no longer benefit the community.

Signed by:

Date:	Date: Community:
_____	_____
(Signature of Main Researcher)	(Signature of Community Representative)
Name:	Name:
Position:	Position:

References

Barki, H., & Hartwick, J. (1989). Rethinking the concept of user involvement. *MIS Quarterly, 13*(1), 53–63.

Barki, H., & Hartwick, J. (1994). Measuring user participation, user involvement, and user attitude. *MIS Quarterly, 18*(1), 59–82.

Dearden, A. (2008). User-centered design considered harmful (with apologies to Edsger Dijkstra, Niklaus Wirth, and Don Norman). *Information Technologies & International Development, 4*(3), 7–12.

Dyson, L. E., & Leggett, M. (2006). *Towards a metadesign approach for building indigenous multimedia cultural archives.* Paper presented at the Proceedings of the 12th ANZSYS Conference–Sustaining Our Social and Natural Capital.

Dyson, L. E., Hendriks, M., & Grant, S. (2007). *Information technology and indigenous people*. Hershey, PA: Information Science.

First Nations Centre. (2007). *OCAP: Ownership, control, access and possession*. Ottawa, ON: First Nations Information Governance Committee, Assembly of First Nations.

Goswami, R., & Basu, D. (2011). Scientific and traditional knowledge: The agenda for 'Mutual Validation'. In R. M. Sarkar (Ed.), *Indigenous knowledge in traditional folk panorama: Genesis, development & applications* (p. 24). New Delhi, India: Serials Publications.

Holland, M. P. (2002). *Digital collectives in indigenous cultures and communities meeting: Meeting report* (S. o. information, trans.). Ann Arbor, MI: University of Michigan.

Holland, M. P., & Smith, K. R. (2000). *Using information technology to preserve and sustain cultural heritage: The digital collective*. World culture report 2000: Cultural diversity, conflict and pluralism.

Kitner, K. R., Beckwith, R., & Ilahiane, H. (2006). Development or stasis: The dilemma of ICT4D. People and Practices Research, Intel Research.

Oppenneer, M. (2010). Memory technologies: Indigenous knowledge and ICT design. Retrieved June 04, 2012, from http://www.ethnosproject.org/site/?p=77

Porsanger, J., Guttorm, G., & Árbediehtu (Eds.). (2011). *Working with traditional knowledge: Communities, institutions, information systems, law and ethics: Writings from the Árbediehtu pilot project on documentation and protection of Sami traditional knowledge*. Kautokeino: Sámi allaskuvla.

Saeed, S., Rohde, M., & Wulf, V. (2008). A framework towards IT appropriation in voluntary organisations. *International Journal of Knowledge and Learning, 4*(5), 438–451.

Shrumm, H., & Jonas, H. (Eds.). (2012). *Biocultural community protocols: A toolkit for community facilitators*. Cape Town, South Africa: Natural Justice: Natural Justice: Lawyers for Communities and the Environment.

Siew, S.-T., Yeo, A. W., & Zaman, T. (2013). *Participatory action research in software development: Indigenous knowledge management systems case study* (Human–computer interaction. Human-centred design approaches, methods, tools, and environments, pp. 470–479). Berlin: Springer.

Velden, M. V. D. (2010). *Design for the contact zone.* Paper presented at the Proceedings of the Seventh International Conference on Cultural Attitudes Towards Communications and Technology, Vancouver.

Winschiers-Theophilus, H. (2009). Cultural appropriation of software design and evaluation. In B. Whitworth (Ed.), *Handbook of research on socio-technical design and social networking systems*. Hershey, PA: IGI Global.

Winschiers-Theophilus, H., Bidwell, N. J., & Blake, E. (2012). Altering participation through interactions and reflections in design. *CoDesign, 8*(2–3), 163–182.

Winschiers-Theophilus, H., Winschiers-Goagoses, N., Rodil, K., Blake, E., Zaman, T., Kapuire, G. K., & Kamukuenjandje, R. (2013a). *Moving away from Erindi-roukambe: Transferability of a rural community-based co-design.* Paper presented at the WG 9.4: Social implications of computers in developing countries, Jamaica.

Winschiers-Theophilus, H., Zaman, T., Jensen, K. L., Rodil, K., & Yeo, A. W. (2013b). *Mobile technologies for preservation of indigenous knowledge in rural communities.* Paper presented at the conference on information technology in Asia (CITA).

Zaman, T., Kulathuramaiyer, N., & Yeo, A. W. (2010). *Formulating strategic directions for indigenous knowledge management systems.* Paper presented at the proceedings of the 2nd semantic technology and knowledge engineering conference (STAKE 2010), Kuching.

Zaman, T., Yeo, A. W., & Kulathuramaiyer, N. (2011). *Harnessing community's creative expression and indigenous wisdom to create value.* Paper presented at the indigenous knowledge technology conference 2011 (IKTC2011): Embracing indigenous knowledge systems in a new technology design paradigm, Windhoek, Namibia.

Zaman, T., Yeo, A. W., & Kulathuramaiyer, N. (2013). Augmenting indigenous knowledge management with information and communication technology. *International Journal of Services Technology and Management, 19*(1/2/3), 12.

Chapter 5
Social Website Technologies and Their Impact on Society

Saeed Alshahrani and Rupert Ward

1 Introduction

Web applications have dominated the concerns of most people because they take a lot of their time.

Among the most prominent of these concerns is the social networking that is available through social network applications on the Internet. Social websites have impacted heavily on social and national identity as well as on the social bonding within the community. Why does the social network matter? Human nature is generally social and people like to live in a community rather than in isolation. Social networks play this role electronically by connecting people as a community regardless of the distance. Evidence shows that these applications are attractive and have a strong influence in various areas.

The deductive approach has been used in this chapter which analysed texts relevant to the subject of the study. Descriptive documentary in the collection of information from sources and references associated with the subject of the study described and employed an approach to describe the phenomenon as list of the diagnosis and detection aspects to determine the relationship between elements with a prospect for the future and predict scientific outcomes.

S. Alshahrani (✉) • R. Ward
Department of Informatics, School of Computing and Engineering,
University of Huddersfield, Huddersfield, UK
e-mail: Saeed.a.alshahrani@gmail.com; Rupert.ward@hud.ac.uk

S. Saeed (ed.), *User-Centric Technology Design for Nonprofit and Civic Engagements*,
Public Administration and Information Technology 6, DOI 10.1007/978-3-319-05963-1_5,

2 Section-1

2.1 The Concept of Social Networking

The terms "websites" and "Internet" have become household names and are always linked to each other although they have different meanings. In fact, some experts tend to confuse the two terms. *The Internet* is a universal network connecting millions of computers, where a user who has permission at any one computer can access and obtain information from any other computer within the network. *Websites* are one of the more popular global network services on the Internet and are sometimes referred to as web services (Shelly et al. 2008). "Websites" are the main method through which Internet contents can be accessed. This technique can be local on a personal machine, a group of computers or globally where access can be obtained from any computer around the world and are called Internet websites. The term "web" comes from the expression World Wide Web (WWW) which also refers to accessing information globally.

In terms of Internet website developments, there are four generations of the web to date and are explained as follows:

WEB 1.0: Web 1.0 is the first generation of Internet websites, which appeared in 1991. Kidd and Chen (2009) define it as "a system of interlinked, hypertext documents accessed via the internet". In the initial use of web 1.0, users mainly used this technique to access data saved on different servers (computers) around the world. Web 1.0 is also known as static, read-only, and client-server web based where users can access to data but are unable to interact directly with other users or modify the contents on this data.

WEB 2.0: Web 2.0 is the second evolution of the web. It appeared in 1999 (DiNucci 1999). Due to rapid developments in the use of this generation of the web, it is difficult to define or explain it accurately (Giustini 2006; O reilly 2007). However, metaphorically, Lincoln improved the definition of web 1.0 to explain what web 2.0 is. He described it as a web in which people can interact and participate rather than just read (Lincoln 2009). So, the fundamental difference between the previous version and web 2.0 is interactivity. The web 2.0 is a dynamic way of interacting among users using a technique called web applications. Since 1999, users have become involved in and were able to participate and contribute to Internet content, so the web concept is no longer "read only".

Social network sites: Social web is part of web 2.0 which has many known synonyms such as social web, social websites and social media. There are many definitions of social networks or social websites as defined by different researchers. However, in the context of web 2.0, Ellison described social websites as follows. They are 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 (Ellison and Boyd 2007). SixDegrees.com, which

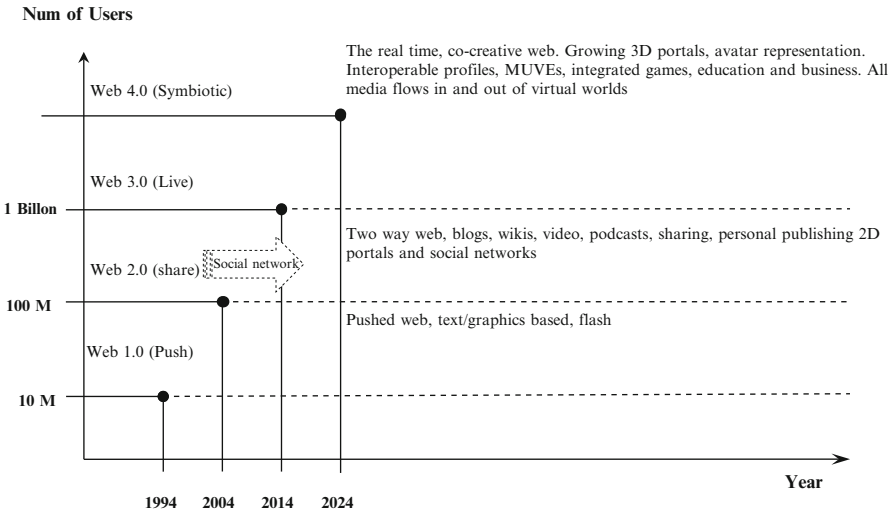


Fig. 5.1 The changing in web—from 1.0 to 3.0, adapted from Hayes (2006)

was set up in 1997, seems to have been the first social network site (Andrews 2011; Ellison and Boyd 2007). Social websites are mainly focused on individuals rather than businesses. Facebook, Twitter and Flickr are well-known examples of web 2.0 applications. Generally, those websites are used for exchanging social activities and tend to have a high level of use. For example, according to the Facebook website which was established in 2004, more than 500 million active users were recorded by the middle of 2011 (Facebook 2012).

Web 3.0: Web 3.0, or the semantic web, appeared in 2006 in an attempt to make electronic devices more intelligent by enabling them to understand each other through web application communications (James 2010). Understanding data is what distinguishes web 3.0 from previous versions. Web 3.0 not only allows humans alone to deal with web applications effectively but also allows other modern devices such as mobile phones and PDAs to have their own applications that can communicate with other computers using web applications.

The future of the web: (Web 4.0) is also known as the "symbiotic web". This version, however, is still in the process of being developed. The aim of the earlier versions of the web is to provide users with smart web solutions. Notice that the solutions already existed but the web presents them in simpler more artistic ways. The idea behind web 4.0 is that the web thinks of solutions for the users (The Hammersmith Group 2009).

The appearance of a new generation of the web does not mean the disappearance of previous generations; it means that there is a major shift from one concept and technique to another. Figure 5.1 shows that web 1.0 was popular between 1995 and 2002 and web 2.0 from 2000 to 2010. Although web 3.0 appeared in 2006, web 2.0 is still extensively used. Web concept has changed from being static, where content

on websites is accessed by users without being able to make any changes, to being more dynamic, social and semantic.

Among the types of web technologies, social websites are considered the most popular. Social websites are distinct from other sites in the World Wide Web, in terms of connectivity. The goal of social networking sites is to create a virtual and technical atmosphere of communication in community. It combines groups of people from different regions and countries on a single site. They are different in many aspects but they use the same technique to communicate. The purpose of communication is different from one person to the other. It could be for the purpose of dating, cooperation, consultation, entertainment only, formation of new relationships, or even for exploration purpose only. The user in this community is an active member and sends, receives, reads, writes, involved, hears and speaks. The users' role in social networks has exceeded the negative role of listening and viewing only. The role of the owner of the site (administration) in these networks is supervision only to ensure that the website is on the right track.

2.2 Types of Social Networks

Social network divisions depend on three criteria: the service provider, the target from its establishment and the access level.

It further can be divided into three main types based on the purpose of establishing these websites. Firstly, personal social websites: which are limited to individuals or group of friends to enable them to create friendship such as Facebook. Secondly, cultural social networks: which focus on a specific art or subject of certain gathered interested in a particular topic such as LibraryThing which is a cataloguing and social networking site for book lovers. Thirdly, professional social networks: which gather people from a similar academic subject to create an environment of effective education and training. LinkedIn is a well-known example of this type of social websites.

Social network can also be divided according to the way we communicate, and these fall into three types. Social networks allow text communication, voice communication and visual communication. Today, social network websites compete with each other to provide more than one way of meeting the needs of all people.

In terms of access level, there are two types or social network: internal social network sites and external social network sites and which are also called local or global. The internal consists of networks of a group of people representing a closed society or privately representative individuals within a company. The educational institution or organisation controls the invitation of other people to enter the site and participate in the activities of recording and exchanging of views and documents, attending meetings and engaging in discussions. The external social websites are networks available to all Internet users but are specifically designed to attract users to the network and allow for many users to participate in its activities as long as the user has registered on the site, such as the network Facebook.

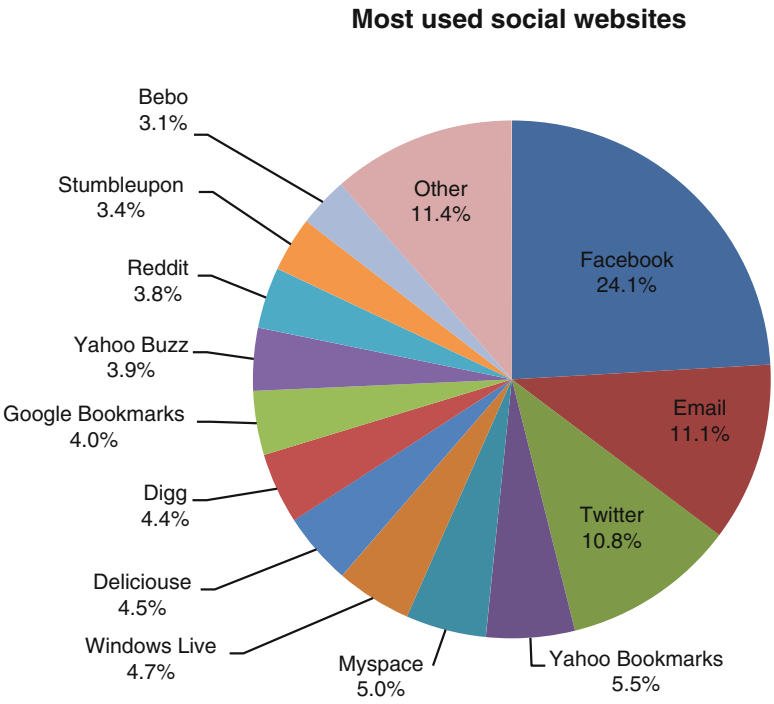


Fig. 5.2 Social websites users' statistics (SocialNetworkStatistics, 2013)

2.3 Statistics

There are number of social network sites around the world. All versions of social websites aim to connect people together. They share quite a similar concept which is based on sharing text, multimedia and other contents. Using social networking applications via the Internet has spread to smartphones and increased the speed of communication between individuals. Most social networking sites are available on smartphones, and there are some social website applications which are available only on the smartphones. Figure 5.2 shows the most used of these websites. The figure is general as the interest, and the use in each of them differ from one country to another (Saw et al. 2013).

As mentioned earlier there are many purposes of using social websites. Eighty-two percent of the users of social websites are aged between 18 and 30 years old. The percentage of teens aged from 12 to 18 years old is 73 %. After the age of 30, the use of social websites continues to decreases with an increase in the age of the user as shown in Fig. 5.3.

Kilian et al. (2012) classified the motivation to use social websites into four categories: entertainment, information, personal identity and integration and social interaction. The entertainment concept is still overwhelming in the use of social

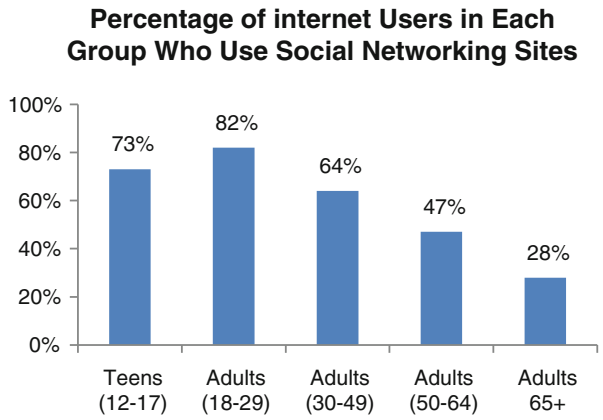


Fig. 5.3 Social websites users (SocialOgilvy, 2013)

network sites compared to other three categories (Lin and Lu 2011). Social network sites have been widely used in business marketing settings, although this use is still not formal but rather friendly to attract the high number of social websites users.

3 Section-2

3.1 Social Networking Risk or Opportunity

Social websites have become an outlet for those who were unable to air their voices to the public. Social website users have been offered a free and easy access avenue to share their views globally with "almost" no restrictions. This access has resulted in a mixture of advantages and disadvantages based on their use.

Many studies have discussed the advantages and disadvantages of using social websites (e.g. Bosch 2009; Krivo et al. 2013; Shih 2013). This section focuses on the impact of these sites on the society and the individual rather than on organisations. Since the first use of social media, many researches have been conducted to assess the advantages and disadvantages of using them in various aspects such as politics, economic technology use, etc. In this section the focus is on the social impact.

3.2 Positive Uses of Social Networks

There is no doubt that social websites have changed the way of communication in most societies. Using social networks eliminates geographical and spatial barriers and shatters the international border, where the individual can easily communicate

with other people in any part of the world. The nature of social networks is based on the interactivity where the concepts of share, reply, post, invite, etc. are very commonly used. It usually involves groups of people where users are required to interact unlike other generations of the web.

3.2.1 Improve Society Ability to Use Technology

Using social media requires basic skills of using technology. Some people learn the technology just for the purpose of taking advantage of online social communications. Learning the concepts and how to use these applications gives the users the ability to learn other computer applications as there are other general computer application concepts (Lenhart et al. 2008).

3.2.2 Personal Communication Uses

In general the Internet has contributed to facilitate communication between people (Coyle and Vaughn 2008). For example, e-mails which are one of the first generation have significantly contributed in improving personal communication. However, the technique of contact in social websites is more attractive and is considered friendlier. Many social applications have been widely used for audio and video communication. They play the same role as phone calls and provide more features during the communication such as exchange of documents and texting. Social websites provide users with many services within one website. Most social websites consist of group of services in one their websites. Services such as live chat, e-mails, invitations, posts, reminders of social events and other features used to be provided separately in earlier versions of web technologies. Skype is a well-known example of these applications. It has been used socially and officially to reduce the cost of calls and to provide interactive communication via online session.

3.2.3 Link Society Members

Social networks improve social relationships in society (Aslam et al. 2012). They keep friends, relatives and family members connected especially when they are geographically far from each other. Social website users publish their activities and social events online so their friends and family members can interact and make comments.

3.2.4 Educational Uses

Social network has not been a widely used concept in learning in terms of exchange of knowledge (Alshahrani and Ward 2013). The role of social networks in the development of e-learning works to add a social aspect and participation of all parties in

the system of education beginning from the school principal to the teachers and the parents and does not just focus on providing schedules for students.

The use of social networks increases the chances of networking and communication outside the school and also breaks the barrier of time to communicate outside the school environment. It eliminates many of the formalities within the schools, and it can be used to communicate with the individuals or collectively with the teacher, which provides an atmosphere of taking into account individual differences. This also enables the student to learn other skills such as communication, discussion and providing their opinion.

3.3 Negative Uses of Social Networks

There are noticeable pitfalls of using social websites. Some of the pitfalls are related to the technical use of these websites while others are related to the misuse of some of the website features.

3.4 Abusive Use

Hacking of social websites is easier than hacking of other types of websites, and the relationship between users in these websites is usually more friendly and trustworthy (Greiner 2009).

Scandals, defamation, harassment, extortion and fraud are common negative behaviours on the social websites. These behaviours appear on the web in general. Hacking social websites seems to be easier than hacking other websites. To do so, one does not require advanced knowledge on websites programming or web security. Although there are laws and regulations for certain types of crimes in some countries, dealing with these crimes is complex because of the wide world use of these applications.

Extortion is one of most common crimes on social websites (Morselli and Décary-Hétu 2013). Some people use these websites to attack other peoples' privacy and then blackmail them. The information used for blackmail could be in the form of video clips, pictures or any sensitive information which the owner does not necessarily want spread on the web.

Impersonation is another form of misuse of social websites. When registering in most of social websites, there is no verification of users' identity. Users can register by providing information which does not necessarily represent them. For this reason, some users impersonate other people by using their names or photos to harm them by representing them badly or in some cases to exploit their popularity.

Some people use these websites for the purpose of committing offences. In 2009, MySpace website which is one of the biggest social websites reported and removed 90,000 known sex offences in 2 days (Greiner 2009).

As mentioned earlier, social websites have successfully gathered people with the same interests and ease the communication between them. Unfortunately, they also gather people with subversive ideas and to unite their efforts to effectively deploy them in the community. This feature is not common in other forms of communication via the Internet.

3.5 Mislead and Distraction

People use social media to distribute their opinions over the Internet. Social website users are free to post whatever they think and believe regardless whether it is right or wrong. There are endless contradictory views on social websites especially where videos and audios are used. For example, on YouTube which is a video-sharing website, when searching for guides, very convincing suggestions may appear which are not necessarily true and might be misleading.

In terms of distraction, the blame has been thrown on social media as a main distraction on people from their usual activities. Over the widespread use of these websites and the success that they have achieved, the recreational use is still the most widely used (Whiting 2013).

3.6 Security and Privacy

Privacy is a big issue in social websites. It is the responsibility of both users and service providers to keep information secure. By registering in these websites, users are required to provide personal information which could be misused when accessed by unauthorised persons. The level of privacy and security varies from one website to the other. Users are not necessarily aware of all these options. Social websites are easy to use, symbols and images that are used in social websites have made it easier for users to use them regardless of the language used (Kamilaris et al. 2013). However, it appears complicated for a normal user to understand the privacy and security options that these websites offer. It is easy for the user to share or publish his personal details accidentally. Yes! Social websites are easy to use but they are not necessarily easy to understand.

Attacking social websites is popular. The idea of attacking users' privacy is based on installing some of their information which helps the hacker to access their account. Hacking of social network sites is easier because communication between the victim and hacker is friendly. They share a kind of trust and therefore the victim might share information in good faith and trust.

According to Thomas et al. (2011), 17 % of accounts on Twitter, which is one of the biggest social websites, rely on hijacking trends, while 52 % of accounts use unsolicited mentions to reach an audience.

3.7 Isolation

Some people become addicted to social website. Studies found that the person who overuses social websites is less associated with society (Kuss and Griffiths 2011). This leads to less engagement and contribution of the person in society. Studies also showed that social websites isolate family members within a single house (Kraut et al. 1998). Each member of the family becomes busy in checking their friends' activities on social network which impacts on the unity of the family in the house.

3.8 Recommendations Geared Towards Avoidance of the Negative Impacts of Using Social Websites

There is no magic prescription to avoid the negative impacts of social websites use. Each single person has his/her reasons for using them. In general users should compare the benefits of using social websites against the time that they spend on them. In terms of reducing the impact of social websites in peoples believes and opinions, it is essential that social website users understand that these websites could circulate useful and non-useful/harm materials (Furht 2010; Umezawa 2008).

In relation to reducing the risk of electronic offences, which is the highest risk of using social websites (Luo et al. 2009), it is important to understand that attacking information through social websites is much easier than other online methods(Kizza 2013; Luo et al. 2009). There are caveats that should be taken into account when using the Internet in general and social networking in particular. From the previously mentioned issues, it is evident that most of the benefits of social websites can be applied negatively and vice versa. There are some tips that could help the normal users to take advantage of using these websites:

- It is not really important how many friends or followers a person has, but the issue is how many of the friends or follower does the person know and trust. So it is recommended that one should not accept strangers' invitations for friendship in social websites.
- Websites and devices that are connected to the Internet are not the safest place to save personal information.
- Account password is important and difficult/complex to guess, and it is the gate for most of hackers. Easy passwords can easily be stolen by hacking tools. It is also recommended to change passwords from time to time and not to use the same password for different accounts.
- It is important to know who you add as friends or participants on your online social space. Being friends with someone means trusting him or her by giving part of your personal information.
- Social websites provide a wide range and level of permission for sharing information. It is important to ensure the correct setting of privacy is chosen.

- Depending on the website, some websites share their users' information with a third party or other websites. Thus, it is important for social website users to know the persons who have access to the information provided.

3.9 Opinion About Social Media Uses

The nature of the relationship in the social websites is more likely to be friendly. However, various studies have found that the relationship between people in real life reflects on their association on social websites. People's views about using about social networks sites as official environment such as work places and education are varied. The relationship between friends in a social website cannot be compared to a study environment such as a student and a lecturer or a boss and a subordinate in a work environment (Alshahrani and Ward 2013). Alshahrani examined the acceptance of using social websites in teaching environment. His results showed that teachers are optimistic about the benefits of using social network sites for communication, but they still have major concerns about their usage. Teachers want to keep the level of power that they have in the classroom as there is no academic rule to control the relationship between "friends", a fact that is also supported by Bosch (2009). On the other hand, the results showed that a majority of the students were optimistic about using social network sites to contact their lecturers but felt that the teachers did not reciprocate their feelings. From Alshahrani's research, it can be said that the nature of social websites is friendly and the success in the use of these websites is not necessarily applicable for formal settings.

4 Conclusions

Social websites are one type of website technologies. This type of web technology has become the most attractive type among other types of web technologies. The number of its users is sharply increasing. Social websites have improved people's connectivity and have also contributed in making their voice heard. These websites are not free of drawbacks and risks of use. It is important for these websites' users to understand the technical concepts of these websites and to be aware of the possible threats that could be associated with using them.

References

Alshahrani, S., & Ward, R. (2013). *Impact of web technologies on student–lecturer expert power relationship*. Paper presented at the 2013 Key West International Academic Conference, USA, Key West.

Andrews, D. (2011). *Digital overdrive: Communications & multimedia technology 2011*. Digital Overdrive.

Aslam, M., Arshad, M. J., Farooq, A., Ahsan, S., Shahbaz, M., Qamar, F., & Moin, S. (2012). Multi-agent system to suggest daily commodities on social networking websites. *Life Science Journal, 9*(2), 57–60.

Bosch, T. E. (2009). Using online social networking for teaching and learning: Facebook use at the University of Cape Town. *Communication: South African Journal for Communication Theory and Research, 35*(2), 185–200.

Coyle, C. L., & Vaughn, H. (2008). Social networking: Communication revolution or evolution? *Bell Labs Technical Journal, 13*(2), 13–17.

DiNucci, D. (1999). Fragmented future. *Print, 53*(4), 32.

Ellison, N. B., & Boyd, D. (2007). Social network sites: Definition, history, and scholarship. *Journal of Computer-Mediated Communication, 13*(1), 210–230.

Facebook. (2012). More than 1 billion active users. Retrieved June 4, 2014, from https://www.facebook.com/facebook/info

Furht, B. (2010). *Handbook of social network technologies and applications*. New York: Springer.

Giustini, D. (2006). How web 2.0 is changing medicine. *British Medical Journal, 333*(7582), 1283.

Greiner, L. (2009). Hacking social networks. *Networker, 13*(1), 9–11.

Hayes, G. (2006). Virtual worlds, Web 3.0 and portable profiles. Personalize Media.

James, K. L. (2010). *The Internet: A user's guide*. New Delhi, India: Prentice-Hall.

Kamilaris, A., Michael, M., Pitsillides, A., & Fidas, C. (2013). *A case study on the use of social electricity by cypriot residents*. Nicosia, Cyprus: University of Cyprus.

Kidd, T. T., & Chen, I. (2009). *Wired for learning: An educator's guide to web 2.0*. Charlotte, NC: Information Age.

Kilian, T., Hennigs, N., & Langner, S. (2012). Do Millennials read books or blogs? Introducing a media usage typology of the internet generation. *Journal of Consumer Marketing, 29*(2), 114–124.

Kizza, J. M. (2013). *Ethical, privacy, and security issues in the online social network ecosystems* (Ethical and social issues in the information age, pp. 255–280). London: Springer.

Kraut, R., Patterson, M., Lundmark, V., Kiesler, S., Mukophadhyay, T., & Scherlis, W. (1998). Internet paradox: A social technology that reduces social involvement and psychological well-being? *American Psychologist, 53*(9), 1017.

Krivo, L. J., Washington, H. M., Peterson, R. D., Browning, C. R., Calder, C. A., & Kwan, M.-P. (2013). Social isolation of disadvantage and advantage: The reproduction of inequality in urban space. *Social Forces, 92*, 141–164.

Kuss, D. J., & Griffiths, M. D. (2011). Online social networking and addiction—A review of the psychological literature. *International Journal of Environmental Research and Public Health, 8*(9), 3528–3552.

Lenhart, A., Arafeh, S., Smith, A., & Macgill, A. R. (2008). *Writing, technology and teens*. Pew Internet & American Life Project, Washington.

Lin, K.-Y., & Lu, H.-P. (2011). Why people use social networking sites: An empirical study integrating network externalities and motivation theory. *Computers in Human Behavior, 27*(3), 1152–1161.

Lincoln, S. R. (2009). *Mastering web 2.0: Transform your business using key website and social media tools*. London: Kogan Page.

Luo, W., Liu, J., Liu, J., & Fan, C. (2009). *An analysis of security in social networks.* Paper presented at the dependable, autonomic and secure computing, 2009. Eighth IEEE international conference on DASC'09.

Morselli, C., & Décary-Hétu, D. (2013). Crime facilitation purposes of social networking sites: A review and analysis of the 'cyberbanging' phenomenon. *Small Wars & Insurgencies, 24*(1), 152–170.

O reilly, T. (2007). What is web 2.0: Design patterns and business models for the next generation of software. *Communications and Strategies, 65*, 17.

Saw, G., Abbott, W., Donaghey, J., & McDonald, C. (2013). Social media for international students—it's not all about Facebook. *Library Management, 34*(3), 156–174.

Shelly, G. B., Cashman, T. J., Wells, D. J., & Freund, S. M. (2008). *Adobe Dreamweaver CS3: Comprehensive concepts and techniques*. Course Technology.

Shih, R.-C. (2013). Effect of using Facebook to assist English for business communication course instruction. *Turkish Online Journal of Educational Technology, 12*(1), 52.

SocialNetworkStatistics. (2013). Social Network Statistics, 2013, from http://onlineprofiling.blog.com/2011/08/03/social-network-statistics/

SocialOgilvy. (2013). Thinking social/value, 2013, from https://social.ogilvy.com/where-in-social-media-are-young-teens

The Hammersmith Group. (2009). *Web 4.0, the internet of things*. New York: The Hammersmith Group.

Thomas, K., Grier, C., Song, D., & Paxson, V. (2011). *Suspended accounts in retrospect: An analysis of twitter spam.* Paper presented at the proceedings of the 2011 ACM SIGCOMM conference on Internet measurement conference.

Umezawa, Y. (2008). *Impact of social and religious support on health-related quality of life in older racial/ethnic minority women with breast cancer*. Los Angeles: UCLA.

Whiting, A. (2013). Why people use social media: A uses and gratifications approach. *Qualitative Market Research: An International Journal, 16*(4), 2–2.

Chapter 6
Improving Visibility of Humanitarian Supply Chains Through Web-Based Collaboration

Mohammad Anwar Rahman

1 Introduction

Humanitarian and disaster relief assistance is a continuous effort spread around the world to support the distressed, displaced, insecure, and needy population. The notable humanitarian relief community includes multilateral agencies such as the United Nations High Commission for Refugees (UNHCR) and the World Food Program (WFP) which are supported entirely by voluntary contributions, mainly by governments both in cash and in kind, as well as a wide range of nongovernmental organizations (NGOs) both national and international (Oloruntoba and Gray 2006). It is impossible to predict where and when an emergency will occur. In a disaster context, the humanitarian organizations reach out to the victims of the emergency, prepare for appropriate commodities, and ensure efficient and effective aid distribution to the victims. However, optimizing the public service performance requires information sharing, coordinated inter-organizational actions, integrated approach among the actors involved, eliminating waste and redundancy, and maximizing efficiency along the entire humanitarian supply chain. Coordinated supply-distribution and inventory policies are well established in business supply chain; however, the key assumptions can be used to find the suitability for the analysis of humanitarian supply chains. The study focuses on the application of key supply chain principles and web-based collaboration to increase the visibility of humanitarian relief supply chains.

Humanitarian relief chains are generally, nonprofit supply chains that coordinate assistance in the form of food, water, medicine, shelter, and supplies to people affected by emergencies (Beamon and Balcik 2008; Balcik et al. 2010). Humanitarian logistics is defined as the processes and systems involved in mobilizing people,

M.A. Rahman (✉)
University of Southern Mississippi, 118 College Drive (#5138),
Hattiesburg, MS 39406, USA
e-mail: Mohammad.rahman@usm.edu

S. Saeed (ed.), *User-Centric Technology Design for Nonprofit and Civic Engagements*,
Public Administration and Information Technology 6, DOI 10.1007/978-3-319-05963-1_6,

resources, skills, and knowledge to help vulnerable people affected by disaster (Van Wassenhove 2006). Briefly, humanitarian logistics represents an adequate response to a disaster and/or humanitarian crisis (Mohan et al. 2013). Recently, a few humanitarian organizations implemented the supply chain principles to develop relief networks (e.g., Mohan et al. 2013; Balcik et al. 2010; Gatignon et al. 2010). With respect to cause, it is possible to distinguish between a natural and a man-made disaster; with respect to predictability and speed of occurrence, it is possible to distinguish between a sudden-onset and a slow-onset disaster (Van Wassenhove 2006). Regardless of the nature of the disaster, the relief efforts are not always well managed due to lack of coordinated effort and insufficient scope of information sharing among agencies and even individuals.

There is evidence of a frequent lack of planning in humanitarian supply chains, resulting in inefficiencies, e.g., overuse of expensive and unsafe air charter, failure to preplan stocks, congestion caused by unplanned deliveries (Byman et al. 2000), and a lack of inter-organizational collaboration for information systems (Long 1997; Long and Wood 1995). Despite some improved coordination, evidence suggests that the humanitarian aid program has become less strategic in the past decade (Byman et al. 2000), and development agencies are contrasted with disaster-oriented agencies (Long 1997). Some argue that humanitarian organization needs to continuously improve and adopt similar to the changing marketing and logistics strategies required for different stages of the product life cycle (Bowersox and Closs 1996). There are other humanitarian agencies serve issue-related tasks and therefore exist only temporarily, with each humanitarian effort requiring a new supply chain (McEntire 1999). Researchers also argue that coordination may be inadequate because of geographical dispersion, insufficient or inaccurate communication between the field and the head offices of humanitarian organizations, and between different organizations (Auf der Heide 1989; Mileti 1999).

In humanitarian relief efforts, the cause of a disaster and location varies. The humanitarian agencies, NGOs, donor organizations, volunteers, local experts, and project participants are geographically distributed. One of the ways to coordinate these efforts could be the establishing of a web-based information network for collaboration. A web portal-based technology can aggregate the scattered and distributed information into one repository to bring synergy among the diverse members. The partners, participating organizations, and members may employ their own hardware platforms and software applications for the operation. A central repository system not only reduces human errors and operational costs but also improves the quality of the humanitarian operations. Although the web-based application of humanitarian supply chain is fairly a new concept, web collaboration has the potential to synchronize multidimensional supply chain activities for humanitarian relief operations. Recent academic literature has pointed that many voluntary organizations are still in an early stage of IT adoption, in their organizational settings (Saeed et al. 2008). As the technology advances, organizations are increasingly taking advantage of the internet and information technology to create a virtual e-chain to communicate and collaborate with supply chain participants (Manthou et al. 2004).

A virtual enabled supply chain network is a series of value-added processes/stages owned by one or more enterprises, starting with material/information suppliers and ending with consumers (Papazoglou et al. 2000; Gek Woo et al. 2000). Organizations increasingly take advantage of the internet and information technology to create a virtual e-chain to communicate and collaborate with other supply chain participants (Manthou et al. 2004). The provision for internet uses and information technology can enhance humanitarian organizations' capability to participate in e-collaboration. A number of initiatives and programs are available to improve interoperability and coordinate web services for web-based integration (e.g., Cheng et al. 2010; Danso-Amoako et al. 2006; Saeed et al. 2008).

While information technology and internet are the key enabler to improve operations and e-management for businesses, humanitarian organizations have been relatively slow to take advantage of the emerging IT for e-collaboration efforts. Most organizations use computers for general applications, such as accounting, e-mail, and video conferencing. Humanitarian organizations need to examine the following questions for appropriate adoption of technology prior to establish virtual supply chain.

- What facilities are available for humanitarian organizations to improve their service, availability, market presence, communication, cycle time, supply-base management?
- How should humanitarian organizations structure internet-enabled linkages with partners, donor organizations, and suppliers for preemptive responses?
- Does an organization understand the real benefits of an e-supply chain versus the cost to develop?
- What e-supply chain strategy will provide a humanitarian organization the leverage to become a service leader?

Recently, a few organizations, however, appear to utilize the web-based application to coordinate the humanitarian supply chain networks. The challenges these companies confront is the foundation of web-based humanitarian supply chain networks and ability to continuously update the information. Majority of the humanitarian organizations are located and constantly function in the developing nations. The difficulties of the web-based supply chain applications are even greater as infrastructures in the region are insufficient. It is important to display how to cope with the scope of web-based collaboration mechanism using the contemporary electronic devices. This study presents a strategy for humanitarian relief organization through the use of web-based supply chain networks.

Organizations can use portal technology to aggregate scattered and distributed information in a web-based system to improve interoperability during humanitarian operations. The foundation of a web-based collaboration follows certain principles. The first task prior to establish a web-based collaboration is the development of a supply chain coordination system. Once the supply chain adaptation to humanitarian operation is initiated, the web-based integration of information technology can be used to improve the needs analysis and collaboration with other organization, partners, and volunteers. It is imperative to discuss the best practices of supply chain inventory systems is the managing of humanitarian goods supply, replenishment,

and fill rate policies to maintain a desired customer service level during the relief operations. Finally, the intellectual ventures of humanitarian relief supply chain should always find the opportunity and scope to further improve the web-based application for supply chain collaboration.

This chapter comprises six core sections. Section 1 introduces humanitarian supply chain and web collaboration strategies. Section 2 discussed the supply chain adaptation to humanitarian services and inventory replenishment policies for relief works. A mechanism for web portal-based supply chain network is illustrated in Sect. 3. Section 4 describes the intellectual ventures of humanitarian relief supply chain. Finally, the remarks and conclusion of this study is described in Sect. 5.

2 Humanitarian Services

Supply chain and logistics is central to coordinate humanitarian operations, such as relief works, emergency service, and developing infrastructure related to relief operation. Hence, humanitarian supply chain needs to be managed in the most effective (doing the right things) and efficient (doing things right) manner (Van Wassenhove 2006; Gatignon et al. 2010). The supply chain concepts in businesses are well established. We will focus on how the principles of supply chain can be applied to coordinate functions with specific goal for improving humanitarian efforts. The key difference between contingency business planning and crisis management is that the former develops a plan of action in advance of the event, while the latter develops a plan in real time while the event is unfolding (Hopp 2008).

2.1 Supply Chain Adaptations to Humanitarian

Humanitarian supply chain management has been approached from a variety of perspectives. François et al. (2009) presented a dual cycle model that features the operational actions of disaster reaction and recovery, which includes an emergency response stage followed by rehabilitation and reconstruction stage. The humanitarian efforts are broadly divided into two main phases: direct relief activity and development activity. Direct relief activities provide continuous support to insecure population and emergency support at the aftermath of calamities caused by a disaster. These supports are generally short-term activities which include providing food, medical, shelters, and services to minimize immediate risks to human health and survival. The development activity phase starts followed by relief activities. Development activities usually continue for longer term. These activities include community building, establishing permanent shelter, sanitation, transportation, healthcare, housing, food, and water. Disaster relief operation is described in three phases as preparedness, during operations, and post-operations (Lee and Zbinden 2003). Key success factors in managing humanitarian supply chains fall into two

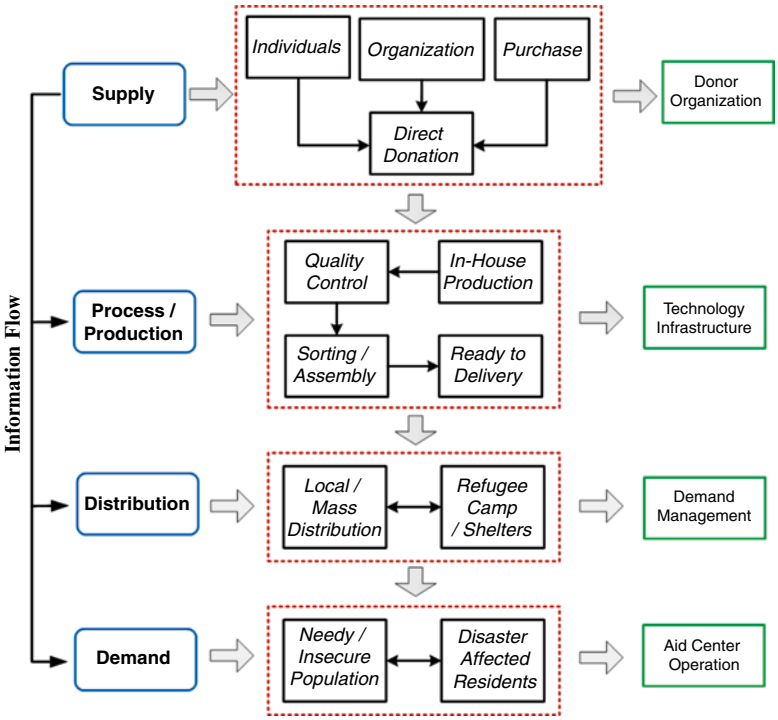


Fig. 6.1 A conceptual framework for humanitarian supply chain

broad categories, namely (a) preparedness and readiness and (b) unity of direction and cohesive control of responding agencies (Oloruntoba 2010).

Humanitarian supply chain management can be defined as the process of planning, execution, and control in terms of managing the flow of relief goods, resources, establishing inventory, reducing costs and related services from point of origin to point of emergency application, as well as information sharing between partners to fully meet the needs of affected population. The basic concept of supply chain management for humanitarian organizations is fundamentally similar to those with the traditional supply chain for business. However, humanitarian supply chain can be more complex than the traditional profitable organizations. Organizations may need to involve in several different and parallel supply chains such as food supply chain, non-food relief supplies, and food for development activities. Different approaches and structured services may need to implement for attaining the desired services. Focusing on logistics support and supply chain system, the principles of strategic plan for humanitarian relief operation are described into four phases: demand, supply, operation, and distribution as presented in Fig. 6.1.

Determining the needs and logistics coordination to provide faster, cheaper, and better response to the needy is the most important principle of humanitarian supply chain. Following hypothesis demonstrates the framework for supply chain staging for humanitarian organization.

Hypothesis 1

A positive relationship and functional coordination exist between the humanitarian activities and supply chain processes that increase the logistics capabilities such as physical flow and distribution of goods, financial stream, and information flow.

Demand: Main challenge of humanitarian supply chain is the ability to deal with uncertainties and align demand planning according to consumer needs. Humanitarian organization faces emergencies caused by natural disasters (e.g., flood, earthquake, hurricane, and wildfire) and man-made disasters (e.g., war, industrial accident). In addition to emergency situation, responders also experience a persistent demand of food, health, medicine, secure location, and economic opportunities from the deprived or insecure population. These demand also derived from influx of refugees due to political crisis. It is necessary to improve the effectiveness of humanitarian organization to coordinate the supply and demand to make sure the agent has enough inventories on hand to render the service.

Supplies: Supplies should be based on service needs. Primary support of humanitarian action is the donation in the forms of monetary and non-monetary means. Monetary support may arrive from individual donor, organization, corporations—as a part of their social responsibility and government. Non-monetary support can be in the form of volunteer service, technical expertise, products such as food, medicine, clothing, housing materials, and volunteer services to hospitals, and rehabilitation centers. Following factors are necessary to consider for supply planning: (a) quantity of the relief items needed in each lot, (b) response time that affected people can endure, (c) service level, and (d) (transportation/distribution) lead time. Besides the physical supplies to the insecure consumers, organizations also need to respond to the donors who support the project and the volunteers and staff members who help to get the project work done. Failing to the service to insecure consumer, donors, and the volunteers could challenge the endurance of the organization.

Operation: Typical humanitarian operations include demand assessment, supplier selection (potential donor, merchandizer), product and service collection (as donation or purchase), quality check, sorting, delivery, and distribution. Humanitarian aid can come as monetary help and/or direct donation of product such as food, medicines, and vaccines. Before supplying to aid seeking people all products, especially food and medicine must be checked to ensure the conformance with standard and dates. For receiving the monetary help a bank account and database with donor access are required. Transparency of collection and the usage of money can be maintained through a secured database system. For receiving product, a warehouse and logistics team is required. If any item is received from the retail chains, it should be accounted properly to the grocers account to enable tax benefit. The quality check of incoming material is a required process after receiving the aid. Generally food and medicines are checked to identify damage in the packages, or expiry date etc.

Distribution: Overall organizational success of a humanitarian organization depends on the successful distribution of product for public services. The

distribution requires planning and coordination for logistics operation. It requires the product differentiates according to customer proximity and speed. Proper planning is essential to provide immediate response to supply and distribution. Swift flow of goods and a reliable shipping and delivery method are also very crucial for emergency response. Since humanitarian organizations are run by donations, the effective plan for providing maximum benefit to the sufferers is an important factor for continuous donor support.

One of the major impacts within the humanitarian supply chain is how to respond to unexpected demand. One of the ways to accomplish this is the application of the Internet. The executives, donors, and supply chain partners can use a network to communicate and share information within the organization via internet. Web-enabled supply chain channel span the performance of humanitarian organization by increasing the visibility of supply-demand information and real-time cooperation between employees and volunteers' within the organization and share concurrent information with strategic partners. Utilization of web system empowers multiple tasks to complete simultaneously and improve productivity.

2.2 Inventory Policy in Humanitarian Aid Supply Chain

The most important challenge of emergency disaster management and logistics is reducing the harm a disaster causes to its victims (Ozguven and Ozbay 2007). Regardless the cause of the problem, a significant challenge of emergency management is relief distribution and establishing a working reserve for food and necessary aid. The working stock is known in business as inventory. Humanitarian actively plans to possess and move inventory to fulfill the needs of the affected people. Inefficient inventory management may result in shortages of goods when it is needed the most, while redundant supply causes stockpile of items. Determining an appropriate inventory policy is well established in commercial supply chain; however, the key assumptions can be used to develop humanitarian supply chain inventory policy.

Optimal inventory policies provide necessary information about the replenishment time, quantity and fill rate, and service level so that limited resources are not wasted and underlying needs of end users are maximized. Following are the important terminologies commonly used in business supply chain modeling: (a) product flow time: movement of products during each stage of the distribution process; (b) stock out: a customer order arrives when product is not available; (c) product fill rate (f_r): fraction of demand that is satisfied from product in inventory; (d) order fill rate: fraction of orders that are filled from available inventory; (e) cycle service level (CSL): fraction of replenishment cycles that end with all customer demands met. In the business and humanitarian service, the inventories of the products continuously change. The working inventory is necessary to respond to any change of needs of the end users during a catastrophe. Figure 6.2 illustrates the continuous change of inventories corresponding to real demand.

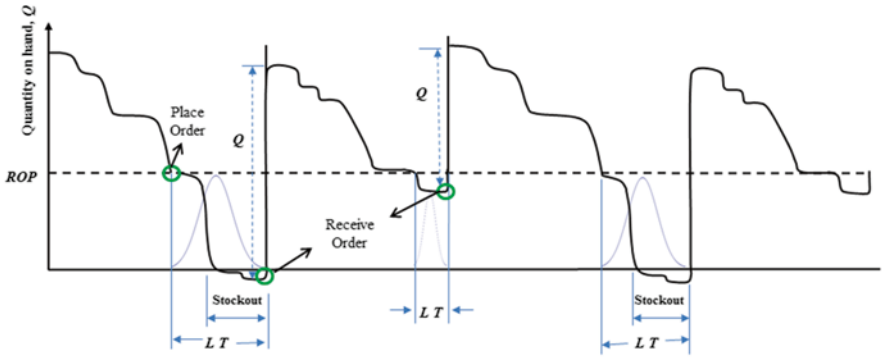


Fig. 6.2 Inventory dynamics with time

Referring to Chopra and Meindl (2012) and Baillou (2004), the study will show the formulas and examples on how to design the ordering quantity (Q), reordering point (R), and stocking level (S), and Microsoft Excel implementation for supply chain systems and data upload.

2.3 Evaluating Reorder Point and Flow Time

The primary purpose of humanitarian supply chain is to maintain public services at a satisfactory level. A basic trade-off involved in all humanitarian inventory system is the demand versus supply. Another important component of inventory is the cost; for example, holding inventory in permanent storehouse or temporary reserved place entails cost. The key challenge in humanitarian inventory management is the appropriate balance between the demand, cost, and desired service level. The optimal ordering quantity (Q^*) is determined by associating the demand and the cost functions.

Suppose, procuring an estimated quantity to meet end user's demand (D) in a time period requires an ordering cost (k) for order processing, setup, transportation and timing of shipment, as well as the holding cost (H) for maintaining the inventory in the storage. By minimizing the basic cost functions, the equation for optimal inventory is given by

$$Q^* = \sqrt{2kD / H} \tag{6.1}$$

Once the product is received, the stocked quantity in the reserve builds the cycle inventory ($Q/2$). In addition to cycle inventory, there exists another inventory to accommodate instant variability, which is known as the safety stock (SS). For humanitarian services, safety stock is crucial to meet unpredictable incidences and protect from unreliable supply. The cycle inventory and safety stock jointly comprise the average inventory (I_{avg}).

$$I_{\text{avg}} = \frac{Q}{2} + \text{SS} \tag{6.2}$$

The lead time (LT) is a period of time that elapses after ordering/requesting the items and the order arrives. Since demand of relief goods always changes, the demand during transportation lead time also varies, which often refers to a mean and standard deviation. The expected demand during transportation lead time is $D \times \text{LT}$. The quantity for reorder point (ROP) is a point when an executive places an order. The safety stock (SS) is defined the inventory position at ROP minus the demand during lead time. This indicates the safety stock becomes negative whenever demand during lead time exceeds the inventory position at ROP (i.e., if the supplies do not arrive in time or delays, there will be shortages).

$$\text{SS} = \text{ROP} - D(\text{LT}) \tag{6.3}$$

The quantity for reorder point (ROP) is determined by the demand during replenishment lead time and variation of demand during that period.

$$\text{ROP} = D(\text{LT}) + \sigma_{\text{LT}} \tag{6.4}$$

where

$$\sigma_{\text{LT}} = \sigma_D \sqrt{\text{LT}} \tag{6.5}$$

If the demand during lead time is approximated with a normal distribution with mean (μ) and standard deviation (σ), the ROP in Eq. (6.4) can be estimated as

$$\text{ROP} = \mu_{\text{LT}} + z(\sigma_{\text{LT}}) \tag{6.6}$$

where z is the desired service level factor (chosen by the service agencies) given by the ith percentile of the standard normal distribution. The value for z can be found in normal table; (using table, if $i = 95$ %, then $z = 1.645$). In Excel value for z is calculated as follows:

Set a Cell = percentile (as a decimal); use "normsinv"(cell) gives the Z score for a percentile.
If i-th percentile is 97.5%, then, "normsinv(0.975)" = 1.96

Inversely, the z-score can provide the percentile as

Set a Cell = Z score , use"normsdist"(cell) gives the percentile (as a decimal) for a Z score.
If z score is 1.96, use "normsdist"(1.96)= 0.975.
The i-th percentile is 97.5%.

Besides determining the optimal ordering quantity and ROP, organization must also address how to determine the "average flow time" of the product at the storage.

Average flow time (γ_f) is determined by the proportion of average inventory with respect to the throughput rate.

$$\gamma_f = I_{avg} / D \tag{6.7}$$

The disaster management planning should comprise the principles of contingency business plan with emergency management plan for unexpected events. The event considered in humanitarian supply chain management is dynamic; therefore the management of a crisis needs to be planned carefully.

Example 1: Evaluating ROP given an inventory policy
Suppose in a satellite food reserve center, a humanitarian agent distributes perishable item (say, gallon milk). Following is the estimated data that daily demand (D) in a disaster area is 1,600 gal and standard deviation (σ_D) is 510 gal. The replenishment lead time (LT) is 1.5 days and daily carrying cost is \$0.25 per gallon (30 % per year, each gallon cost \$3.0) and batch ordering (k) is \$255. What is the ROP that the agent should place order for new replenishment? The ordering point is crucial in determining the inventory replenishment policy.

The reorder quantity, $Q = \sqrt{2kD/H} = (2\times1600\times255)/0.25=1806$ units

Demand variation during Leadtime, $\sigma_{LT} = \sigma_D\sqrt{LT} = 510\sqrt{1.5} = 624$ gallons.

Assuming a 90% fill rate, $Z_{0.9} = 1.282$,

$ROP = D(LT) + Z_{(90\%)}(\sigma_{LT}) = 1600\ (1.5) + 1.282\ (624) = 3200$ gallons

Example 2: Evaluating flow time of perishable food
In the satellite center, the agent must establish a food reserve after conformance of the expiry date of fresh food. The agent makes sure that average time spends in the reserve should be the minimum, while the food supplies are large enough to avoid any shortages. Consider the same daily demand and standard deviation in the example above. Assuming a high (say, 90 %) fill rate, the humanitarian agent is calculating the average time that milk bottles stay as food reserve in the satellite aid center.

Demand during lead time (DL) = (1600)(1.5) = 2400
Ordering quantity (Q) = 1,806; the reorder point (ROP) = 3,200 gallons, derived above

Safety stock (ss) = ROP - DL = 3,200 – 2,400 = 800
Cycle inventory = $Q/2$ = 1806/2 = 903
Average Flow Time = Average inventory / throughput rate

Average Inventory = *cycle inventory* + *ss* = 903 + 800 = 1703 units.
Average Flow Time = Average inventory / throughput rate = 1703/1600 = 1.064 days

Average time spend in the relief aid center is 1.064 days. In this problem, the main decision variable is selecting the reordering point and the ordering quantity. Obviously high reordering point increases the average time spends in the storage. By changing the ROP and Q^*, humanitarian sector can change the average flow time.

2.4 Evaluating Shortage and Fill Rate

A key way to measure the responsiveness is by computing "product flow time" (γ_f), "cycle service level" (CSL), and "fill rate" (f_r). The "Fill Rate" is the integral part of a supply chain that quantifies the fraction of orders that are filled from available inventory. This study will demonstrate how to calculate "customer service level" and "consumer fill rate" using Excel. In the above example, consumer "Fill Rate" refers to proportion of demand (need) is filled from inventory in stock. The "Fill Rate" (f_r) is given by

$$f_r = 1 - \mathrm{ESC} / Q \tag{6.8}$$

$$\mathrm{ESC} = -\mathrm{ss}\left\{1 - F_s\left(\frac{\mathrm{ss}}{\sigma_{\mathrm{LT}}}\right)\right\} + \sigma_L f_s\left(\frac{\mathrm{ss}}{\sigma_{\mathrm{LT}}}\right) \tag{6.9}$$

where ESC = average demand in excess of ROP in each replenishment cycle, Q is the ordering quantity, ss is the safety stock, σ_L is standard deviation of demand, and F_s is probability distribution. For a normal distribution, using Excel:

$$\mathrm{ESC} = -\mathrm{ss}\left\{1 - \mathrm{NORMDIST}\left(\frac{\mathrm{ss}}{\sigma_{\mathrm{LT}}}, 0, 1, 1\right)\right\} + \sigma_L \mathrm{NORMDIST}\left(\frac{\mathrm{ss}}{\sigma_{\mathrm{LT}}}, 0, 1, 0\right).$$

CSL is the probability of stocking out in a replenishment cycle. CSL is determined by the probability that demand during lead time (LT) ≤ ROP. Since CSL is mathematically complex, a satisfactory approximation can be found by the equation below.

$$\mathrm{CLS} = F\left(\mathrm{ROP}, D_{\mathrm{LT}}, \sigma_{\mathrm{LT}}\right) \tag{6.10}$$

For a normal distribution, using Excel: CLS = NORMDIST(ROP, D_{LT}, σ_{LT}1) = 90 %

Example 3: Evaluating shortage and fill rate

Given $ss = 800$, $Q = 1803$, $\sigma_{LT} = 624$, Fill Rate (fr) = ?

$ESC = -ss\ \{1\text{-}NORMDIST\ (ss/\sigma_{LT}, 0, 1, 1)\} + \sigma_{LT}\ NORMDIST\ (ss/\sigma_{LT}, 0, 1, 0)$

$= -3{,}200\ \{1\text{-NORMDIST}\ (800.8/624.6, 0, 1, 1)\} + 624.6\ \text{NORMDIST}\ (800.8/624.6, 0, 1, 0) = 30$ units

$fr = (Q - ESC)/Q = (1806.7 - 29.54)/\ 1806.7 = 0.984$

The result indicates that in any given cycle, 98.4 % of the demand is filled from inventory in stock.

For a normal distribution, using Excel:

$CLS = NORMDIST(ROP, D_{LT}, \sigma_{LT}\ 1)$

$= NORMDIST(3200.76, 2400, 624.6, 1) = 90\%$

A CLT 90 % implies that in 90 % of the replenishment cycles supplies all demand from available inventory. In other words, in 90 % cases all needs will be available to satisfy the needs. In the remaining 10 % of the cycles, stockout may occur and some needs may not be satisfied because of lack of inventory.

Results indicate that fill rate (98.4 %) is higher than the CSL (90 %) for the same replenishment policy. The international organization, NGOs, and donors can use web portal to update the details of supply information. The portal system not only displays types of good distributed, quantity, affected population but also places order (or request) for new replenishment, arrival time of the next batch in order to maintain a steady state flow of inventory level and humanitarian service.

3 Web Portal-Based Supply Chain Network

With the increasing rate and severity of natural and man-made disasters, the humanitarian responders require collaboration, interoperability, and multifaceted information system to respond effectively. This section focuses a web-based mechanism to transmit real-time data among partner organizations during humanitarian relief operations. Web portal technology aggregates scattered, distributed information, and processes information to make useful across organizational boundaries. A web portal system provides the clients a single point of access to information and applications regardless of their location or storage mechanism (Cheng et al. 2010). In a crisis, humanitarian organizations can use web portal systems to develop a central data repository to facilitate information collection and documentation to improve interoperability. An intranet using web-based portals allows the partners to access sensitive internal information and authorized administrative applications to manage information at the centralized location. The usages of this data repository and intranet linking require a central server and database to support the supply chain collaborative operations.

A portal is a web platform, generally defined as a software platform for building websites and web applications. Modern portals have added multiple features that the humanitarian organizations can use to make the best choice for a wide array of web applications. Humanitarian public service requires a complex array of technical and social endeavors to increase the service efficiency and reduce the impact of adversities. Relief organization can use portal system for multiple applications to integrate a workflow with partners to form a humanitarian supply chain. Cheng et al. (2010) provided state-of-the-art use of portals for common applications as a content management system (CMS) or a web publishing tool to develop a framework of dynamic humanitarian supply chain system.

Using web portals, humanitarian organizations can develop dynamic websites that may allow the following listed in Table 6.1.

Web portal design depends on the application. In designing portals for humanitarian organizations, the consideration should be given for usability with limited internet access. The construction of web portals for humanitarian organizations should be user friendly and light in design in order to provide easy access to navigate data and

Table 6.1 Web portal on humanitarian supply chain system

Action	Accomplishments
Share	Share information and present different pages depending on donor's login status and donor's role
Integrate	Integrate multiple existing web applications
Collaborate	Allow a group of donor organizations or individual donors to collaborate through documentation, amenities, and activities
Build	Administrators may build pages by reusing existing portlets and gadgets

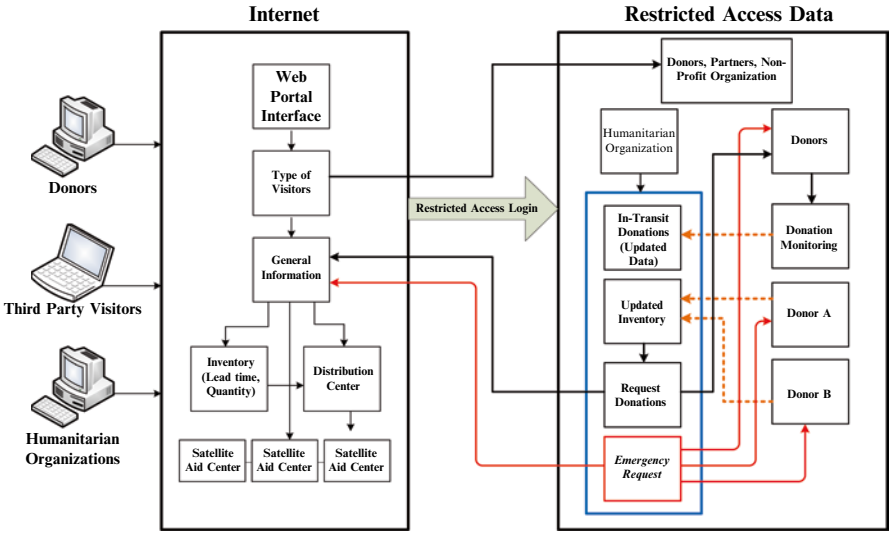


Fig. 6.3 Conceptual framework of humanitarian supply chain using web portal

securely manage data under any circumstances. A detail network of humanitarian supply chain flow process and information using web portal is presented in Fig. 6.3.

A humanitarian website may feature a set of pages describing its services, amenities, and contact information that are accessible to all. However, after a customer login, additional content may be available such as social service information, volunteer, job opportunities, and training. Further logistics information may become accessible to authorized partners and government agencies. Using portals, the humanitarian organizations may create websites with "General Purpose Pages" and "Restricted Use Pages" with different content depending on involvement and role in the humanitarian efforts. When humanitarian organizations introduce a web portal for coordinated activities, some information must be kept under restricted access due to donor policies. Some supplies could be acquired by special monetary prices that are not available in the public market, or some supplies could be acquired by means of no monetary price. This information could vary from donor to donor. The accessibility

to the internal data of the organization should be visible to donors. It is not always practical for humanitarian supply chain partners to share their own database system, internal information, and step-by-step effort to transport and deliver products to public domain due to security, ownership rights, and proprietary privacy.

There may be two levels of data base system, restricted and unrestricted configured in the web portal. Partners may want to share sensitive information such as discount product price for humanitarian relief only to specific supply chain members for a specific period of time using restrictive database system. Other collaborators may use an unrestricted distributed network system to receive and share information within the same portal system.

A humanitarian web portal can have community pages where portals allow end users to define pages, and add content to their pages using predefined portlets or gadgets. The organization can define and allow access to users in these community pages. These portals may have accessibility to "Multiple Languages" and "Multiple Platforms" (e.g., smart phones, tablets) for partners, volunteers, and service recipients. The activities of a humanitarian supply chain using a distributed web portal network is presented in Table 6.2.

Table 6.2 Humanitarian supply chain activities in a distributed web portal network

Title	Content
Database	It is a dynamic database where information update is visible to administrators and visitors to a certain extent. *Contains donor list, products, warehouse, transportation, delivery service, and distribution to public. Demand and supply data.*
Restricted control data	Only accessible to few selected stakeholders such as donor organizations, large individual donors, partners, government office, United Nations transporters, suppliers, distributors, and emergency service holders. *These stakeholders can update the database in their parts.*
Unrestricted control data	Open to all visitors of the website. Some of the information are dynamic e.g., fund collection, supply, demand, and emergency needs. *Donors and other visitors can see the latest updates of service, location, fund collected in the website, how these funds are distributed, volunteers need, local experts, and in other functionalities.*
Web portal	Humanitarian organization can use web portals for centralized storage of information and a unified hub to integrate information, applications, and services. *Partners, volunteers, and service recipients can access to multiple systems or applications via web portal with a single registration and authentication.*
Portlet gateway	Using the portal platforms, a partner of volunteer may build web pages and websites by assembling portlets or gadgets onto a portal page. *Portal websites can combine a theme, a set of pages, navigation (menu bar, etc.), and a set of portlets and gadgets.*
Regional aid distribution center	Logistics hubs-connection between organizational administrator, warehouse, and regional aid distribution center. *Plan and arrange connection between administrator, warehouse, and regional and satellite aid sites.*
Satellite aid center	Distribution hubs *Mobile aid center specially designated to distribute aids.*

Another form of web implementation, for example, Passport Business Solutions™ (PBS) uses Microsoft SQL Server for automatic inventory management. It requires to install PBS SQL on Microsoft SQL Server 2008 (or 2005) R2, running Enterprise, Standard or Express editions. SQL makes all data accessible with a wide variety of tools that are much easier, user friendly, without the need for custom programming; tools such as Microsoft Access, Word, and Excel allow users to easily manipulate the data (PBS 2013). The PBS system tracks what humanitarian goods have been requested or shipped, a record of all activities that have occurred throughout any particular day, week, month, quarter, etc. A similar system can be used as web publishing tool to store the data about the consumer, volunteer, vendors, partners, and the inventory that a humanitarian organization maintains.

4 Intellectual Ventures of Humanitarian Relief Supply Chain

The web services model has emerged as a promising approach to build online data storage infrastructure and aggregate distributed information sources. The investment for developing web-based relief supply chain is a major intellectual venture for humanitarian organization. Utilizing the Internet as the communication network, a "web service" can be described as a specific function that humanitarian organizations provide services to users. Specific information sources and software applications can be packaged into an explicit web service component. Similar to any investment portfolio, humanitarian IT portfolio requires a balanced strategy to achieve a short- and long-term pay off *t*. In any humanitarian crisis, millions want to participate and share efforts. However, the most unpaid assistant cannot arrive at the crisis zone, because of their job, business, and other commitment. Besides, there are people who may not able to donate a large amount, but ready to offer professional help which may appear as tremendous monetary and intellectual values. The web services approach of humanitarian relief model may able to connect and aggregate efforts from promising volunteers and local experts. There are a number of mission-related benefits that may motivate the humanitarian organizations to gain competitive advantage through web collaboration and supply chain strategic planning: (a) wider involvement of the volunteer and local experts in a service region, (b) reduce service and operational costs, (c) increase throughput for the same budget, (d) provide transparency and mission-related information including: product, inventory, service, account, control, collaborate, and analysis (e.g., mission analysis, service performance), (e) gain competitive advantage through supply chain and IT investment. The web service components can be plug-and-played to cater different project requirements at each project stage. The reusability of the components also reduces the time and efforts to develop similar components. Table 6.3 lists IT based for the near-term, mid-term and long-term capabilities for e-supply chain adoption (adopted from Rao 2007).

Table 6.3 IT-based e-supply chain capabilities using promising technologies

Capability	Promising technologies		
	Near term	Midterm	Long term
Improved situational awareness	• RFID resource tracking and logistics	• Embedded networked sensors	• Data mining across diverse information sources • Automated information fusion • Network & information security.
Improved decision support and resource tracking and allocation	• Online resource directories, commercial collaboration software, and file sharing	• Dynamic responsibility charting	• Coordinated transportation
		• Intelligent adaptive planning tools	• Communication & decision support • Computer-assisted decision-making tools
Organizational agility for disaster management	• Computer-mediated exercises	• Online repositories of lessons learned	• Continuous learning tools
		• Integrated ad hoc data-collection tools (blogs/wikis)	• Computer-assisted disaster simulation training • Distributed, scalable, survivable data logging • Dynamic capability profiling
Interoperable & priority sensitive communications	• Cellular & wireless networking	• Cellular infrastructure, intelligent sharing	• Policy-based routing & congestion management
	• Internet/IP-based networking	• Multiple input/multiple output wireless systems • Integrated voice, data	• Self-managing & repairing (autonomous & adaptive) networks
Better public engagement	• Automated & multimodal public notification & resource contact systems	• Volunteer mobilization systems	• Automated public reporting tools
	• Multimodal public reporting capabilities	• Distributed, dynamic private resource directories	• Optimized data formatting for differing presentation devices
	• Validated online information sources	• Enhanced two-way communication with public	

These IT-based capabilities have the potential to further integrate e-supply chain operation through quick disaster response, and disaster recovery, disaster preparedness, and improve hazard mitigation.

5 Conclusion

Humanitarian supply chain management requires a critical knowledge and tool set for supply chain application to organize mission-related activities such as relief aids procurement, transshipment, on time delivery, and emergency services at an acceptable level of quality. The aim of this study has been to examine the applicability of well-established business supply chain principles to coordinate functions with specific goal for improving humanitarian efforts. Although contingency business plan of action can be done in advance, the humanitarian crisis management plan needs to be developed in real time as the event unfolds. This study also focuses on increasing the visibility of humanitarian relief services by collaborating information network technology with traditions of business supply chain planning. Improvement in technology not only reduces operational costs but also provides faster and desirable services. The web-based data sharing and interoperability allow the humanitarian service sectors to significantly improve their coordination effort and services quality. Web integration of supply chain can be an economical and customizable tool to integrate supply chain partners, volunteers, and develop supply chain networks for a wide range of relief operations. The web-based supply chain strategies enable all necessary supplies to organize in real time, vital to respond to the distressed people and emergency relief activities. The web-based service enhances overall operational system, provide transparency, which in turn, act as process keeping by making informed decisions and critical thinking. With the technology available today, the portal-based system allows visibility in the service, improves organization culture and human-related subjective factors (e.g., trust, incentive). The collaborative supply chain effort is clearly significant, yet evidently neglected and need to be considered when improving the service quality of the humanitarian organizations.

Since humanitarian organizations operate across the globe, the integrated logistics, supply chain models, and inventory policies play an important role in the relief distribution tasks. Using web portal systems, the humanitarian organization can develop web service model. Specific applications and information sources can be enveloped and organized as individual web portlets as a web service unit in the model. Any particular event such as training sessions, volunteer service, and user preferences can be stored in a portlet through the portal system. This e-collaboration enhances mission-related efforts and increase in visibility of organizational accomplishments and performances.

In a disaster scenario, the unstable organizational structures, diversity, lack of cooperation, and insufficient capital flow could be the main impediments to facilitate web-based humanitarian aid services. Due to the tasks need to be done by humanitarian organizations, a web-based portal becomes a vital point of contact in

order to fulfill their main goal. Leveraging well-established Internet protocols and commonly used machine readable representations, web services can be located, invoked, combined, and reused. The disaster management plan is more complex as it masses a number of supply chains in parallel, and it requires the contingency policies to be blend with emergency management plan for meeting upcoming crisis. Humanitarian agency and donors need to understand that the resources for appropriate information systems and supply chain processes are as important as much as tangible relief supplies. With e-supply chain and e-collaboration, humanitarian organizations can integrate large number of donors, volunteers, and organizations, and virtually connect to a value chain of supplies quickly in real time with limited resources, facilities, and interaction.

References

Baillou, R. H. (2004). *Business logistics/supply chain management* (5th ed.). New Jersey, NJ: Pearson/Prentice Hall.

Balcik, B., Beamon, B. M., Krejci, C. C., Muramatsu, K. M., & Ramirez, M. (2010). Coordination in humanitarian relief chains: Practices, challenges and opportunities. *International Journal of Production Economics, 126*, 22–34.

Beamon, B. M., & Balcik, B. (2008). Performance measurement in humanitarian supply chains. *International Journal of Public Sector Management, 21*(1), 4–25.

Bowersox, D. J., & Closs, D. J. (1996). *Logistical management: The integrated supply chain process*. New York: McGraw-Hill.

Byman, D., Lesser, I., Pirnie, B., Benard, C., & Waxman, M. (2000). *Strengthening the partnership: Improving military coordination with relief agencies and allies in humanitarian operations*. Washington, DC: Rand.

Cheng, J. C. P., Law, K. H., Bjornsson, H., Jones, A., & Sriram, R. (2010). A service oriented framework for construction supply chain integration. *Automation in Construction, 19*, 245–260.

Chopra, S., & Meindl, P. (2012). *Supply chain management strategy, planning and operation* (5th ed.). Boston: Prentice Hall.

Danso-Amoako, M. O., Issa, R. R., & Cox, R. (2006). Developing a framework to support data exchange from heterogeneous sources via IFC and web services. *Proceedings of the 11th International Conference on Computing in Civil and Building Engineering, (ICCCBE XI), Montreal, Canada*, 2477–2486.

François, M., Lindgreen, A., & Vanhamme, J. (2009). Developing supply chains in disaster relief operations through cross-sector socially oriented collaborations: A theoretical model. *Supply Chain Management: An International Journal, 14*(2), 149–164.

Gatignon, A., VanWassenhove, L. N., & Charles, A. (2010). The Yogyakarta earthquake: Humanitarian relief through IFRC's decentralized supply chain. *International Journal of Production Economics, 126*, 102–110.

Gek Woo, T., Shaw, J., & Fulkerson, B. (2000). Web-based supply chain management. *Information Systems Frontiers, 2*(1), 41–55.

Hopp, W. J. (2008). *Supply chain science*. New York: McGraw-Hill/Irwin.

Lee, H. W., & Zbinden, M. (2003). Marrying logistics and technology for effective relief. *Forced Migration Review, 18*, 34–35. Oxford, United Kingdom.

Long, D. (1997). Logistics for disaster relief: Engineering on the run. *IIE Solutions, 29*(6), 26–29.

Long, D. C., & Wood, D. F. (1995). The logistics of famine relief. *Journal of Business Logistics, 16*(1), 213–229.

Manthou, V., Vlachopoulou, M., & Folinas, D. (2004). Virtual e-chain (VeC) model for supply chain collaboration. *International Journal of Production Economics, 87*, 241–250.

McEntire, D. A. (1999). Issues in disaster relief: Progress, perpetual problems, and prospective solution. *Disaster Prevention and Management, 8*, 351–361.

Mohan, S., Gopalakrishnan, M., & Mizzi, P. J. (2013). Improving the efficiency of a non-profit supply chain for the food insecure. *International Journal of Production Economics, 143*(2), 248–255.

Oloruntoba, R. (2010). A documentary analysis of the Cyclone Larry emergency relief chain: Some key success factors. *International Journal of Production Economics, 126*(1), 85–101.

Oloruntoba, R., & Gray, R. (2006). Humanitarian aid: An agile supply chain. *Supply Chain Management: An International Journal, 11*(2), 115–120.

Ozguven, E. E., & Ozbay, K. (2007). Stochastic humanitarian inventory control model for disaster planning. *Journal of the Transportation Research Board, 2022*, 63–75.

Papazoglou, M., Ribbers, R., & Tsalgatidou, A. (2000). Integrated value chains and their implications from a business and technology standpoint. *Decision Support Systems, 29*, 323–342.

Passport Business Solutions™ (PBS) (2013). Passport Software, Inc. [Online]. Available from http://www.pass-port.com. Accessed 13 July 2013.

Rao, R. R. (2007). Improving disaster management: The role of IT in mitigation, preparedness, response, and recovery. US: National Academies Press [Online]. Available from http://www.nap.edu/catalog/11824.html. Accessed 19 April 2013.

Saeed, S., Rohde, M., & Wulf, V. (2008). A framework towards IT appropriation in voluntary organizations. *International Journal of Knowledge and Learning, 4*(5), 438–451.

Van Wassenhove, L. N. (2006). Blackett memorial lecture. Humanitarian aid logistics: Supply chain management in high gear. *Journal of the Operational Research Society, 57*(5), 475–489.

Part II
Case Studies

Chapter 7
Exploring Civic Engagement on Public Displays

Simo Hosio, Jorge Goncalves, Vassilis Kostakos, and Jukka Riekki

1 Introduction

Research and deployment of public interactive displays is moving from laboratory environments into urban spaces and public areas (Müller et al. 2010). Public displays augment the activities in the space around them by facilitating different use cases, such as public statements (Ananny and Strohecker 2009; Dalsgaard and Halskov 2010), play and performance (O'Hara et al. 2008; Hosio et al. 2012), or information foraging (Kukka et al. 2012). It is even envisioned that such public display installations will fuel the next big wave of social change (Kuikkaniemi et al. 2011).

In our research we seek to augment urban space with public displays to promote civic engagement by addressing local and temporally and spatially relevant issues. Civic engagement lacks a unified definition in literature, but in general it is perceived as an instrument for local governance and a foundation to empower people, often by informing citizens and utilizing feedback channels towards authorities (Mohammadi et al. 2011).

Over a 2-year period, we incrementally evaluated applications that disseminate information about a long-term renovation project in Oulu, Finland. We used these applications to disseminate information about the construction work being done and by enabling users to provide in situ comments and feedback to the local Technical Centre (later TC). The TC is responsible for the execution of the renovation project, and while information provisioning has been of principal interest to them, our focus has also been on studying the characteristics of different situated feedback mechanisms in authentic city settings.

S. Hosio (✉) • J. Goncalves • V. Kostakos • J. Riekki
Department of Computer Science and Engineering, University of Oulu,
P.O. Box 4500, Oulu 90014, Finland
e-mail: simo.hosio@ee.oulu.fi; jorge.goncalves@ee.oulu.fi;
vassilis.kostakos@ee.oulu.fi; jukka.riekki@ee.oulu.fi

S. Saeed (ed.), *User-Centric Technology Design for Nonprofit and Civic Engagements*,
Public Administration and Information Technology 6, DOI 10.1007/978-3-319-05963-1_7,

To study different feedback mechanisms, we utilize a grid of large touch screen displays deployed in pivotal locations in Oulu nearby the renovation project, where citizens and tourists alike can utilize them in a 24/7 fashion. Unlike in most prior work that relies on bespoke displays, ours feature several applications for different purposes making them multipurpose displays (Ojala et al. 2012). Many public displays are envisioned to be multipurpose in the future, just like smartphones today, and therefore, it is crucial to acknowledge the implications that utilizing such displays have on applications. Applications on multipurpose displays do not attract nearly as much use as ones deployed prominently on bespoke displays (Kostakos et al. 2013; Hosio et al. 2013). However, their advantages are crystal clear: they can be customized to offer "something for everyone."

Feedback prototypes have been developed for public displays situated in special events (Brignull and Rogers 2003; Hosio et al. 2012), university campuses (Day et al. 2007), online (De Cindio et al. 2009), and more recently especially for mobile environments (Korn and Bødker 2012; Goncalves et al. 2013a, b, c). However, we are not aware of any previous studies that explore the larger issue of civic engagement using public displays in large-scale field trials in authentic settings and without active researcher intervention and participant recruitment.

In this chapter we summarize and reflect on our experiences of using public displays as a public situated feedback channel. The key contributions of this chapter are:

- We characterize how applications for civic engagement were used and appropriated in field trials in authentic settings.
- We quantify the effectiveness of various feedback mechanisms used with public displays.
- We propose factors to consider when deploying future civic engagement or feedback applications on interactive public displays.

2 Related Work

Previous research shows that civic engagement is beneficial for individuals, institutions, and communities as well as for the broader society (Clary and Snyder 2002; Montero 2004). While citizens are encouraged to adopt more active roles, civic engagement can only be fostered on the basis of reciprocal trust between people and responsible institutions (Uslaner and Brown 2005). Civic engagement can be viewed from the perspective of benefits to be gained and costs to be borne. These benefits include not only material advantages but also psychological satisfaction for participants (Hirschmann 1982).

In our work, we seek to foster civic engagement and offer gratification by partnering with the responsible institution of the renovation project, thus empowering citizens to have their voices heard. Further, we provide a novel feedback modality—in situ interactive displays—and explore the benefits for individuals (citizens) and the corresponding institution (the TC).

2.1 Public Displays and Feedback

Public display research has focused heavily on interaction, attention, and design, but relatively little attention is given to civic engagement. Civic engagement calls for understanding of functional feedback mechanisms. Previously, public displays have been proposed especially as a viable *opportunistic feedback* medium because they allow passersby to understand situated and contextually relevant information, leading to genuinely insightful feedback (Battino et al. 2011). Supporting this, Ananny and Strohecker (2009) argued that public opinions are highly situated, and De Cindio et al. (2009) observed that people leave feedback often during so-called peak or protest moments, when the circumstances for public discourse or disapproval are right. These results together raise the question whether situated feedback mediums could be leveraged to reach people during these key moments for discourse.

We expect these moments to occur when citizens confront a public display in Oulu and are given the possibility to leave instant feedback about a locally remarkable and topical issue that invades their territory: the renovation project that affects traffic in the whole downtown area. Public displays also foster sociality and group use by nature (Kuikkaniemi et al. 2011; Peltonen et al. 2008), and getting feedback from groups of users is often easier than from individuals (Hosio et al. 2012). Further, the well-known *honeypot effect* (Brignull and Rogers 2003) can be leveraged to our advantage in spreading awareness about the feedback channel among nearby potential users.

Archetypal feedback applications on public displays utilize typing in some form as their main input modality. Brignull and Rogers (2003) reported on *Opinionizer*, a system that combined a projected screen with a laptop to type feedback and converse about the everyday contexts it was deployed in. They noted the honeypot effect and emphasized social pressure and awkwardness that users often feel when interacting publicly. Ananny and Strohecker (2009) leveraged public screens and SMS to create public opinion forums. Their *TexTales* installations highlighted how urban spaces can become sites for collective expression and nurture informal, often amusing discussions among its habitants. More recently Goncalves et al. (2013a, b, c) explored the use of altruistic crowdsourcing as a mechanism to collect more serious contributions from similar urban spaces.

A playful feedback application, connected to social networking services and utilizing a virtual keyboard and a web camera for feedback, was introduced in Hosio et al. (2012). Studies with *Ubinion* also highlighted situated public displays being well-suited for acquiring contextually relevant feedback. Similar projects (Day et al. 2007; Munson et al. 2011) developed feedback systems for campus settings, utilizing online interfaces, dedicated mobile clients, and Twitter as input channels. In these studies, Twitter was suggested as a good tool to provide content for public displays, and SMS was envisioned handier for feedback than dedicated mobile applications. A similar project to ours was deployed in Brisbane, where the *Discussions in Space* prototype was deployed on public screens to elicit feedback via Twitter and SMS, further validating their use as viable input mechanisms (Schroeter 2012).

We set to explore the question of whether situated interactive displays can be leveraged for obtaining feedback on subjects that are highly local and of interest to authorities, i.e., for civic engagement. The key difference between our work and most of the related work is that we do not deploy new screens or infrastructure for our studies, but aim for authentic experience with no novelty effects. We utilize multipurpose public displays that have been deployed already for years prior to our study and test both previously utilized feedback mechanisms together with novel ones during the course of our studies.

2.2 Deploying in Urban Spaces

Civic engagement should be possible for all social groups (Mohammadi et al. 2011). Therefore, deploying our system "in the wild" for everyone to use was a fundamental requirement. The urban space itself is a rich yet challenging environment for deploying pervasive infrastructure and applications (Müller et al. 2010). Several considerations, including the intertwined social practices of the area, robustness of the technology, abuse, vandalism, balance between the different stakeholders, and even weather conditions may cause constraints when deploying in the wild (Dalsgaard and Halskov 2010; Korn and Bødker 2012). However, to gain an understanding of how technology is received and appropriated by the general public, deployment in authentic environments, or *living laboratories*, is highly beneficial (Rogers et al. 2007; Sharp and Rehman 2005).

We seek to evaluate situated feedback mechanisms for civic engagement in an environment and with an audience that cannot be fully controlled. In reporting our trials, we follow the advice by Brown et al. (2011) to move beyond reporting artificial success: rather than proposing a solution that fulfills all the needs of all involved stakeholders, we report what happened with the chosen solutions in the complicated setting.

3 Studies

We conducted two field studies and a supervised deployment in between to evaluate civic engagement applications on public displays, in collaboration with the local TC. The TC was closely involved since including domain experts is favorable in application-led research (Sharp and Rehman 2005). The developed applications allow citizens to learn about the renovation project and to provide feedback about it.

3.1 Environment

To frame our studies, we first clarify the scale of the renovation project in question. It included building new pavement and underground heating systems for two of the busiest pedestrian streets in downtown Oulu, heavily affecting pedestrian flows and

Fig. 7.1 One of the walking streets being renovated

everyday business in all the surrounding areas. Figure 7.1 illustrates the scale of the construction. The downtown area is rather small, and most of the pedestrians are forced to use these main streets. Due to weather conditions the work was completed during summer months (typically the busiest months in downtown), which further contributed to the disruptive nature of the renovation project.

The displays used in our studies are 57″ full-HD touch screen displays with Internet connectivity, fitted in weather-proof casings. Many of the displays had been located in the vicinity of the renovation project area already for several years and as such have gone beyond novelty to become an accepted and domesticated part of the city infrastructure. This is important, as inserting novel technology in public often leads to strong novelty effects and bias in the actual usage. We used 12 displays, 5 of which were located on the renovated streets (e.g., Fig. 7.2). The rest of the displays were situated nearby in other pivotal locations, such as a public library or a popular swimming hall. A complete and detailed description of the infrastructure and the displays has been described earlier in Ojala et al. (2012).

It is important to note that the displays were not dedicated to the feedback application alone, but multiple (20–25) applications were offered to the users at all times. The other applications offered directory services, news and weather, image and video galleries, and games. Particularly games have been identified as the most popular group of applications that people use. Interestingly, this follows the generic trend in mobile applications stores, where games traditionally dominate the top-downloaded lists.

The application we developed for the renovation project was accessible by one click from the public displays' "main directory," which opened when users were

Fig. 7.2 An interactive display at the end of a walking street in Oulu

either sensed in the vicinity of the displays or touched them. The application itself was not dedicated to feedback, but it also provided information about the progress of the renovation project. The feedback functionality was accessible through an icon depicting the renovation project and "give feedback" as the textual call to action. The instructions in the feedback interface for all studies we describe in this chapter were: "Leave anonymous feedback to the city officials about the renovation project. Please note that your feedback will be delivered directly and unmodified."

3.2 Study 1

The design of the first feedback mechanism was based on a single requirement from the TC: to offer a text-based channel for leaving free feedback on the renovation project. Several public display prototypes have successfully leveraged a large on-screen virtual keyboard for typing (Hosio et al. 2012, 2013), and thus, we chose to use the same mechanism in this context. The submitted messages were directly emailed to the TC representatives, who decided to receive the feedback without moderation. This interface can be seen in the top left of Fig. 7.3.

The application ran on our display grid for 3 months during the summer of 2011. During this study, the application was launched 1,406 times, and 35 feedback messages were dispatched to the TC. Two researchers categorized the feedback messages into "relevant" and "not relevant" messages, depending on whether they offer feedback of the renovation project or consist of something else. Eight of the items were found "relevant" (Cohen's kappa: 1.00).

Fig. 7.3 Feedback interfaces. *Top left*: Study 1, *top right*: Study 3a, *bottom left*: Study 3b, *bottom right*: Study 3c

This being the case, it was apparent that the deployment resulted in a relatively high percentage of *noise* (77.1 %). We define noise in this chapter as *messages that have nothing to do with the renovation project*, i.e., irrelevant messages. Examples of noise from Study 1 include such messages as "It's fun in Oulu," "LOLOLOL," or random nicknames. The underlying themes of noise will be discussed in depth later in this chapter.

In situ open-ended interviews with citizens during the final weeks of Study 1 revealed that the application was seen as one of the most useful and interesting applications deployed on the displays at the time, thanks especially to its high relevance to local topical issues. Again, it should be noted that the other applications were not only games, but also more "serious" applications, such as news, local directory services, arts, and multimedia were available. This was a promising finding as itself: the feedback channel was a new kind of service to citizens and was received positively.

Fig. 7.4 Study 2 setup in a university lobby

Finally, a post-study interview with the TC revealed that they were very satisfied with the deployment in general: for them it was an original and novel channel that was perceived beneficial by citizens. We agreed to build a follow-up prototype together for a later phase of the renovation project (in this chapter: Study 3).

3.3 Study 2

We organized a controlled follow-up study to better understand the reason for the large amount of noise generated in Study 1. A controlled environment was selected to observe and interview users who give feedback using public displays. Such a separate study was needed, as users of the first study were fully anonymous and we could not contact them. Study 2 was conducted in a university lobby equipped with a display identical to the previous study. We replicated the feedback window of Study 1 and added an image explaining the study structure. We also decided to change the topic of feedback to *general issues in education in the university* to maintain high relevance between the context and the topic. The setup of Study 2 can be seen in Fig. 7.4.

We recruited 18 passersby (12 male, 6 female) aged 20–37 ($M = 27.3$, SD = 4.7) to participate in this study. To familiarize participants with leaving feedback using the interactive display in public, they were asked to leave four comments. The first three comments were defined by us, because we wanted the users to become familiar with the input mechanism first. The final one they had to come up with on their own. We conducted an open-ended interview about leaving feedback through a public display with each participant.

The results revealed that public displays were strongly preferred for "spur of the moment" and contextual feedback. Related research also finds it easier to obtain high-quality feedback with closely situated mechanisms (Ananny and Strohecker 2009; De Cindio et al. 2009). Some participants commented "If I just finished a horrible lecture, I'd definitely use it [the public display] to give feedback… Maybe when I got home, I probably would not care about it anymore. I would like to just spit it out right away," and "Yes, I would use public display easily spontaneously, right after a lousy meal or a bad lecture…." People were giving positive statements about the possibility to type immediately with the on-screen mechanism.

The virtual keyboard, however, was also criticized. It became apparent that typing longer messages was seen as inappropriate or even physically painful on public displays. Comments like "Public display is very cumbersome when typing longer texts" or "My arm was just killing me after a little while using the public display to write the comments" reflected this. On-site observations also confirmed this, as participants often felt uncomfortable when typing using the virtual keyboard.

Finally, several participants noted feeling uncomfortable to give in-depth, emotional, or negative feedback alone on public displays and that it would be perhaps more suitable to think about feedback in groups when using public display.

3.4 Study 3

Study 3 was a longitudinal field study, similar to Study 1, of a civic engagement application. It was deployed on the same grid of displays, as one of many applications (20–25). It provided information about the renovation project and offered feedback mechanisms for citizens. Study 3 lasted 3 months during summer 2012 and consisted of three 1-month iterations (Studies 3a, 3b, 3c). Again, the TC oversaw the general look and feel of the application, and we designed the feedback mechanisms. This time the feedback messages were not relayed real time to the TC, but our researchers moderated and dispatched them in weekly batches via email. However, the moderation was not disclosed to users of the application interface, in order to keep the wording in the interface similar to that of Study 1.

3.4.1 Study 3a

Participant suggestions from Study 2 like "…you should consider giving choices instead of making the user write" or "On the public display, just use anything except typing, please" led to reconsiderations when designing Study 3a. We replaced the virtual keyboard with four new mechanisms for feedback: SMS, twitter, and email for text-based feedback and a smiley-based poll-style mechanism directly on the screens. SMS and Twitter have been used successfully in conjunction with public displays for feedback before (Ananny and Strohecker 2009; Munson et al. 2011),

and several participants from Study 2 suggested using something quicker and more effortless than virtual keyboard on the public display.

For SMS and email we created a dedicated number and address for receiving feedback, and a specific hashtag was used to identify tweets as feedback intended for our system. The smileys were used to rank personal agreement on two statements defined by the TC. Statement 1: "The large renovation project in is topical and necessary for Oulu!" Statement 2: "City of Oulu officials are informing citizens sufficiently about the renovation project!" The smileys were captioned using standard 5-point Likert scale statements from "strongly disagree" to "strongly agree," from left to right. The users had to rate both statements and touch a "send button" to register their ratings. In the end of this study, we conducted 20 in situ open-ended interviews among pedestrians in downtown Oulu about the application in general. The interface of Study 3a is depicted top right in Fig. 7.3.

During this study, the application was launched 381 times, leading to *zero* feedback via email, SMS, or twitter, while 20 smiley submissions were made with an average rating of 3.8 (SD 1.5) and 3.4 (SD 1.6) for statements 1 and 2, respectively. Interviews with 20 citizens (7 male, 13 female, $M = 28.0$, $SD = 11.6$) revealed that smileys were always preferred to the text-based feedback mechanisms. Email was the favored medium of the offered text-based mechanisms by majority of the interviewed, but again, leaving feedback later, e.g., at home and out of context, was seen as very unlikely. Ironically, the majority of respondents expressed the need for a virtual keyboard, as they felt it would be the most straightforward way to submit feedback instantly.

In summary, we received smiley responses, but users were reluctant to devote effort for any of the three offered text-based feedback mediums, which all required the use of personal devices. Interviews highlighted, once more, the need for effortless, in situ feedback mechanisms.

3.4.2 Study 3b

In Study 3b we decided to investigate the reliability of smiley responses and to offer a psychological incentive for the text-based mechanisms, which did not yield any feedback so far. To establish whether the smiley responses yielded valid results, we added negatively phrased versions of the statements to the mix: "The large renovation project at the walking street is not topical or necessary for Oulu!" and "City of Oulu officials are not informing citizens sufficiently about the renovation project!" On each application launch, the shown statement was randomized, i.e., the statements were either negatively or positively phrased.

Also, a stream of the ten latest messages was added to the interface to foster discussion, a practice suggested for enhancing communication between community members on public displays. We hoped this would motivate feedback submission because letting users observe others' messages enhances sense of community, a strong motivator for participation in urban settings (Day et al. 2007; Goncalves

et al. 2013a, b, c). The displayed stream was moderated daily to remove offending and irrelevant comments. The feedback interface of this study is depicted in Fig. 7.3 (bottom left).

During this study, the application was launched 444 times, resulting in 6 text-based feedback messages, all via SMS, and 46 smiley responses (25 for positively and 21 for negatively phrased statements). Similar to Study 1, feedback messages were categorized into "relevant" and "not relevant" by two researchers, and all 6 were labeled relevant (Cohen's kappa 1.0). The average agreement ratings given using the smileys for the positively phrased statements 1 and 2 were 4.4 (SD 1.2) and 4.3 (SD 1.1), respectively. The negatively phrased statements 1 and 2 were rated 3.9 (SD 1.7) and 4.1 (SD 1.4), respectively.

Introduction of the message stream seemed to encourage users to leave textual feedback and use the smiley mechanism more. However, at the same time the smiley-based rating system proved unreliable, as both the positively and negatively phrased statements received high ratings.

3.4.3 Study 3c

Concluding that the comment stream encouraged participation and that the smiley-based poll was not reliable in this context, we modified the feedback interface once more. In Study 3c we decommissioned the smiley mechanism and deployed the virtual keyboard mechanism from Study 1. This time, however, we complemented it with the messages stream, as we anticipated it would enhance both participation and quality if used in conjunction with the virtual keyboard. The feedback interface of this study is depicted in Fig. 7.3 (bottom right). Finally, at the end of this study, we interviewed the TC about the second long-term deployment of the application, i.e., the whole Study 3.

During 1 month of deployment, 40 feedback messages were created using the virtual keyboard. This speaks for the increase in feedback when the stream is displayed, as Study 1, which was three times longer than this study, attracted 35 messages using the virtual keyboard. Two researchers categorized the new messages into "relevant" and "not relevant," resulting in 13 relevant comments and 27 not relevant ones (Cohen's kappa 1.0). Thus, the percentage of noise was 67.5 %, which was a slight decrease from Study 1. An overview of all studies and key findings leading to design alterations can be seen in Fig. 7.5.

Difficulties in running our studies were mostly caused by hardware issues, highly dynamic deployment environment in Studies 1 and 3, and mismatching stakeholder interests, all issues that are common in such deployments (Dalsgaard and Halskov 2010).

Several displays suffered varying amounts of downtime due to overheating or malfunctioning touch screens or had to be temporarily removed because of ongoing renovation project arrangements or even vandalism (one LCD panel was shattered during Study 3b). Secondly, even though we agreed with the TC on implementing

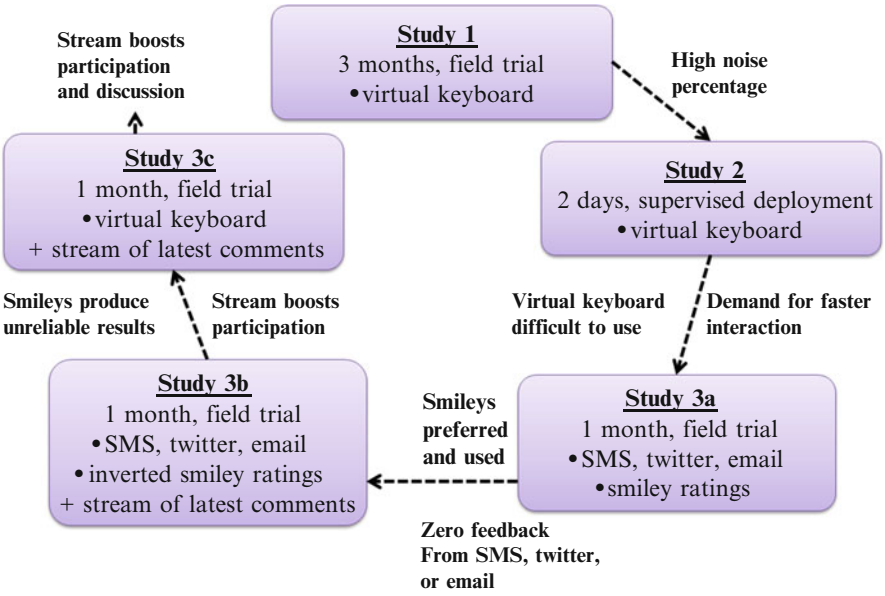


Fig. 7.5 Evolution of our studies and findings

the feedback applications, we had conflicting design opinions. We wanted to emphasize the feedback features, whereas the TC requested us to imitate the look and feel of their current online presence that focused more on presenting information.

We acknowledge that the execution environment has not been fully identical in the studies, perhaps skewing the data. Also the designs of the applications in Studies 1 and 3 were not identical. However, as agreed by Brown et al. (2011) and Huang et al. (2007), in field trials of systems such as ours, unforeseen social, organizational, and technical hurdles are common and often indeed unavoidable. We believe that the scale and length of our field trials counterbalance these effects to a great extent and that we have sufficient long-term results to initiate discussion about civic engagement on public displays.

4 Discussion

In this chapter we have presented a series of incremental studies aiming to investigate the following questions: (1) how does the public use and appropriate public displays for civic engagement and (2) how can the design of feedback mechanisms improve the collected feedback? Our studies were conducted over a long period of time, and with each study we aimed to better understand the findings of the previous study and improve the performance of the system. Civic engagement is hard to measure in the lab or during a quick one-off deployment, and for this reason we

Table 7.1 An overview of key statistics from studies 1 and 3

Study	1	3a	3b	3c	Total
Length in months	3	1	1	1	6
Application launches	1,406	381	444	433	2,664
Virtual keyboard	35	–	–	40	75
SMS/email/Twitter	–	0/0/0	6/0/0	–	6
Relevant textual	23 %	–	100 %	33 %	33 %
Smiley submissions	–	20	46	–	66

relied on longitudinal field trials that tend to become messy. However, through our iteration process and incremental changes to our system, we were able to isolate and evaluate various aspects of the interface and mechanisms we trialed.

Clearly, there is room for improvement in the system we incrementally developed, but there are some delightfully encouraging results. First, the TC did not receive *any* feedback from citizens through the other channels they had in place (phone, website, email) but did receive dozens of comments through our system. Furthermore, our study highlighted fascinating aspects of human behavior, which we unpack in our discussion. Finally, given that our studies have been one of the first in using a novel technology (public displays) for a rather archaic practice (civic engagement), we believe that our findings can help practitioners and researchers incrementally improve the technology to suit the practice.

4.1 Participation and Impact

In total our feedback applications in Studies 1 and 3 were launched 2,664 times (825 during the time smileys were deployed in Studies 3a and 3b). This is 7.2 % of all application use on the same displays (36,874 launches), making our civic information and feedback prototype the *third most launched application*, right after a traditional "hangman" game and the official information bulletin board of the City of Oulu. To us this was a positive indication, as we did not expect high interest towards an application dealing with such a "serious" topic as civic engagement. These 2,664 launches resulted in 81 text-based feedbacks and 66 sets of smiley ratings. Thus, 3.0 % of all application launches led to users leaving textual feedback, and 8.0 % led to users using the smiley-based mechanism. We find remarkable similarities here to behavior in online discussion forums, where *lurking* has been identified as highly common practice. Up to 99 % of users do not participate in discussions in online forums, but rather follow and read information (Nonnecke and Preece 2001). The term *lurker* has an unreasonably bad connotation as well. After all, lurking is in many cases beneficial for the greater community, and a case can be even made for lurking to be normal behavior and participation abnormal: who would be reading if everybody focused on contributing (Nonnecke and Preece 2000)? Especially in civic engagement, information and awareness of participation possibilities is important, because only with these does a meaningful, two-way dialogue become eventually possible. A summary of key statistics from Studies 1 and 3 is presented in Table 7.1.

Another issue here is user motives and pre-qualification. Müller argues that public displays do not invite people for a single reason, but users come across them with no dedicated purpose (Müller et al. 2010). It has also been shown that when a display features multiple applications, many application launches are caused by pure curiosity or play rather than intention of using them (Hosio et al. 2013). These findings together lead us to believe that a portion of the application launches was not intentional, thus lowering the percentage of people who actually submitted comments, and that if the applications were deployed on bespoke displays, the amount of use would be even higher.

Several factors make civic engagement challenging. Downs (1956) has observed that citizens appear to be "rationally ignorant" of topical issues and local policies, because in their opinion the feedback they give will not make a difference or have impact anyway. We are optimistic about the participation and what can be achieved with new types of civic engagement channels that are a permanent fixture in the city fabric itself. While the total of 81 feedback messages we received may not sound like a lot if compared to the results of related feedback prototypes in literature, the TC reported it was the *only feedback they ever received from citizens* in the course of our studies. Based on interviews, the deployment itself was greatly appreciated by citizens, and partially because of that it has opened us further avenues to collaborate with the City of Oulu officials. Their conventional feedback mechanisms were not used for citizen feedback, and they were overall very satisfied with the performance of the new feedback channel.

Several of the feedback messages addressed the ongoing work, indicating that citizens did trust, at least to an extent, in the impact of their feedback and thus in the TC itself. Examples of such messages are "More employees are needed, this needs to be done faster," "We need to be competitive with other cities, this is good," "Looking good, also the new stage looks nice!," "Good but way too expensive show for the City," or "It's great to see the City developing!"

4.2 Feedback Analysis

Of all text-based feedback messages submitted in our field trials, 54 (66.7 %) were categorized as noise, i.e., not relevant to the renovation project. These messages indicate a strong appropriation of the application. Analyzing practices and contexts of use is a major concern in evaluating UbiComp technologies (Korn and Bødker 2012). An in-depth analysis of these messages reveals several underlying social phenomena that designers should be aware of, or even leverage, when crafting future feedback and civic engagement applications for public spaces.

4.2.1 Playing with Technology

Several messages consisted of random characters, such as "v811," "sfrd," or "zadffffgghhjjkkjhbbb." We argue this was caused by users *playing with the technology* and creating a mutual social event around the display rather than focusing on the application purpose itself. This is often observed with groups interacting with mobile devices in public (Kindberg et al. 2005), and to strengthen this, public displays inherently encourage social, performative use (Kuikkaniemi et al. 2011; Ojala et al. 2012; Peltonen et al. 2008). This is also supported by findings in Hosio et al. (2012), where a group of users socializing together around public displays was a major factor in obtaining high numbers of (arguably noisy) feedback.

4.2.2 Self-Representation and Expression

Self-representation and expression were observed in several feedback messages. These are common especially in photography (Van House 2007) and refer to an individual's needs for highlighting his/her activities, humor, or any unique identifiable angles around oneself, i.e., bringing oneself forward. In this case even the visually modest textual feedback channel was enough for users to submit their names or nicknames, affiliations, or mental and physical states. Comments like "I'm Sniff Dogg and I'm a wild guy!" and "My house is not affected by this, yeah" and comments with names or nicknames all represent the strong desire that people feel for expressing and advertising themselves in their appropriation of new communication technologies (Harper 2011).

4.2.3 Documenting Rule Breaking

The third observed phenomenon was *documentation of rule breaking*, a social need according to Schwarz (2011). Users submitted messages of breaking social rules and norms or ridiculing the authority that receives the messages, the TC—without intention to discuss the renovation project. Messages like "I really don't appreciate you…," "It stinks like s**t here, f**k you all!," and "I'm way too drunk to give you any constructive criticism, sorry a**holes" and random swear words all indicate acts of documenting the breaking of rules of social behavior and norms. A free-form, anonymous channel like ours is likely to receive abuse like this when deployed in the wild.

4.2.4 Storytelling and Discussions

Storytelling and discussions are series of submitted messages that complement or continue the previously submitted message. Curiously, these occurred even when the messages were not displayed to the users and were only emailed to the TC.

Storytelling happened both with relevant and nonrelevant (noise) comments. It is illustrated by the following comments that were submitted sequentially in Study 1 during 3 min: "I am a 12-year-old girl"; "I am a 12-year-old girl, from <Location>!"; and "I am a 12-year-old girl, from Tornio, but it was not me! It was Teemu." Self-expression and storytelling are both clearly distinguishable from the sequence. Considering that typing with virtual keyboard was judged cumbersome and frustrating in Study 2, such social play around a display has great potential to overcome those difficulties.

When the message stream was introduced in Studies 3b and 3c, people picked up previous comments and discussed them, often by agreeing and supplementing them. An example sequence from studies 3b and 3c consists of the following messages: "Wasting years because of this small renovation project is way too long," "Also, please add more working hours, it is taking too long," and "Yea, I also really agree on that." This suggests that adding the stream led to further engagement with other citizens.

4.3 Contrasting the Deployed Feedback Mechanisms

Our findings suggest the need for feedback channels at the right moment for discourse (De Cindio et al. 2009) to hold true in civic engagement on public displays as well and that public displays can present instant opportunities for feedback. Several interviews highlighted the need for fast, in situ interaction to give feedback. Further, users would most likely not go through the trouble of leaving feedback later on or search for mechanisms after the optimal moment for feedback has passed.

So while public displays are being recognized as promising medium for feedback (Battino et al. 2011; Hosio et al. 2012), the effectiveness of the actual feedback mechanisms becomes a key challenge. In our particular case it was important for the TC to offer text-based solutions for giving free-form feedback about the renovation project. Virtual keyboard, SMS, twitter, and email were all trialed for this purpose, and their differences turned out to be drastic.

Offering just a virtual keyboard for typing resulted in average *quantity* but high *noise* in Study 1 (27 of all 35 submissions, or 77.1 %), and in interviews of Study 2, virtual keyboard was regarded cumbersome or even physically painful in typing longer texts. However, in Study 3a when SMS, twitter, and email were deployed to facilitate easier typing and to lessen noise, the amount of textual feedback dropped to *zero*.

The stream of latest feedback messages introduced in Study 3b boosted participation slightly, but only with SMS. Twitter and email were not used. This further highlights the need for effortless, in situ interaction mechanisms, as twitter is scarcely used, and it is still far from everyone to have email capabilities in their mobile phones in Finland. Remarkable in the use of SMS, compared to the use of virtual keyboard, is the quality of feedback it produced. All the messages submitted through SMS were relevant to the renovation project. We attribute this to the costs of SMS. Only people who were serious and committed to voice out their feedback were ready to pay for it (at the time of these studies, a standard cost for SMS in

Finland was approximately 0.07EUR). On the contrary, in a recent study Schroeter (2012) found the fact that SMS is not free, a key factor in preventing people from leaving feedback.

Displaying the stream of latest comments turned out to be a major factor regarding feedback quantity. In the 3-month study 1 (i.e., without the stream), 35 feedback messages were left. Introducing the stream to the three times shorter Study 3c led to 40 submitted feedback messages, indicating people participating about three times more when the stream was shown. The stream also allowed for discussions around the renovation project to occur on public displays. Displaying previous feedback comments can be seen analogous to online message boards. Wright and Street (2007) discuss so-called have your say, style message boards, which can be conceived as democratic meeting places, virtual agoras. The underlying value of such boards comes from anonymous, fairly unstructured discussion that allows users to post what they want instead of what the officials want to hear. This shift in power has a liberating effect, as topics and concerns that people are interested in arise, but the officials are perhaps not aware of.

Finally, interviews in Study 3 revealed citizens preferring the use of smiley ratings over other trialed mechanisms. As expected, the smiley-based poll-style feedback mechanism turned out to be popular also statistically. However, it was not reliable, as in Study 3b the positively and negatively phrased statements were both rated overall high, illustrating users' tendency to merely choose options on the right end of the scale. The effects of order in Likert-type scales have been studied widely (Chan 1991), and this behavior holds true especially in paper-based environment. Our studies are the first ones to point the same to apply for public displays as well. Another common reason for the potential invalidity of such poll-style mechanisms can be "non-attitudes." Converse (1970) suggests that people usually offer "top-of-the-head" answers when confronted by polls in public, just to avoid appearing as ignorant. In highly public settings like ours, this behavior might be strengthened.

5 Summary of Lessons Learned

Impact will not be immediate, so calibrate citizens' expectations and the scope of interaction. One-off deployments or novel installations are not viable solutions for long-term, ongoing civic participation. We chose to conduct the study in an authentic setting without explicit advertising in order to call for longitudinal action and support for sustained participation, both very much encouraged in community involvement (Clary and Snyder 2002). Our prototypes calibrated citizens' participation: while a multimillion multi-year project *cannot* be turned around given the opinions of few, day-to-day improvements *can* be made to ease the impact and side effects of such a big renovation project. Our prototypes explicitly focused on obtaining this type of daily feedback.

Expect moderate participation. Concerning the deployment environment, related literature often leads to expectations that getting hundreds of feedback items with public displays is effortless (Ananny and Strohecker 2009; Battino et al. 2011; Brignull and Rogers 2003; Hosio et al. 2012). However, a common factor in all these prototypes is a disruptive deployment, dedicated to the service alone and informal or even amusing feedback topics. We advise not to expect in naturalistic settings the same quantity and quality of feedback reported in literature in controlled or short-term studies. This holds true especially with civic engagement, which lacks mass appeal (Uslaner and Brown 2005) and towards which people are often ignorant (Downs 1956; Schroeter 2012). In addition, feedback is certainly not the only contributing factor in civic engagement—informing and creating awareness is one of the key elements as well and should not be neglected when analyzing "success" of civic engagement deployments.

Feedback designs do not work flawlessly as advertised in literature. Virtual keyboards and personal, mobile input mechanisms have been suggested earlier as successful feedback mechanisms in conjunction with public displays (Ananny and Strohecker 2009; Hosio et al. 2012; Schroeter 2012). While we found drastic differences between their performances in our work, none of them performed exceptionally well. In addition, and interestingly, the smiley-based mechanism, which was liked the most in our interviews, produced unreliable results.

Social and performative behaviors are major driving factors, confirming previous studies of interactive public displays (Kuikkaniemi et al. 2011; O'Hara et al. 2008; Ojala et al. 2012; Peltonen et al. 2008). Various social needs, such as self-expression or documenting rule breaking, present themselves in the use of new communication channels, and public displays do not seem to be an exception to this (Harper 2011; Kindberg et al. 2005; Schroeter 2012). The interviews in Study 2 also support findings of Brignull and Rogers about the awkwardness and social pressure that people feel when interacting alone with public displays (Brignull and Rogers 2003). Our participants expressed discomfort in submitting emotional or negative comments. These findings, while needing further validation, have important implications on eliciting civic discourse with public displays. If people are not willing to express their honest opinions on the spot, public displays should be used more to disseminate information and advertise the means of remote, more private participation. In this study, the TC regarded information dissemination and especially the PR value of the deployment as superior to the obtained feedback itself.

6 Conclusion

We present studies that investigate the feasibility of using public displays for civic engagement. We highlight and analyze psychological and sociological reasons behind their appropriation. We also find in situ interaction mechanisms as the most

desired ones on public displays. Our interviews indicate that offering the possibility for direct feedback was highly appreciated by both citizens and the TC.

We argue these kinds of deployments will have increasingly great role in increasing reciprocal trust between citizens and authorities, and we advocate the use of public displays in connecting these two entities as they are an opportunistic medium that is equally accessible to all locals. One of the most important facts supporting this is the ability of public displays to reach otherwise unreachable citizens (Hosio et al. 2012; Schroeter 2012). Thus, researchers should not be concerned only about the feedback quantity and quality or how different mechanisms perform immediately, but rather think long-term and set broader goals for civic engagement on public displays. In the spirit of our own advice, we certainly have several civic engagement services deployed on our displays at the time of writing this chapter.

Acknowledgments This work was supported by Microsoft Research through its PhD Scholarship Programme. The financial support of the Finnish Funding Agency for Technology and Innovation, the European Regional Development Fund, the City of Oulu, and the UBI (UrBan Interactions) consortium is gratefully acknowledged.

References

Ananny, M., & Strohecker, C. (2009). TexTales: Creating interactive forums with urban publics. In M. Foth (Ed.), *Handbook of research on urban informatics: The practice and promise of the real-time city* (pp. 68–86). Hershey, PA: Information Science Reference, IGI Global.

Battino, P., Vande Moere, A., & Barsotti, V. (2011). Situated and social feedback in the city. In *Workshop on large displays in urban life: From exhibition halls to media facades in the ACM CHI Conference on Human Factors in Computing Systems*, ACM Press.

Brignull, H., & Rogers, Y. (2003). Enticing people to interact with large public displays in public spaces. In *The IFIP International Conference on Human-Computer Interaction* (pp. 17–24).

Brown, B., Reeves, S., & Sherwood, S. (2011). Into the wild: challenges and opportunities for field trial methods. In *The ACM CHI Conference on Human Factors in Computing Systems*, ACM Press (pp. 1657–1666).

Chan, J. C. (1991). Response-order effects in Likert-type scales. *Educational and Psychological Measurement, 51*(3), 531–540.

Clary, E. G., & Snyder, M. (2002). Community involvement: Opportunities and challenger in socializing adults to participate in society. *Journal of Social Issues, 3*, 581–592.

Converse, P. E. (1970). Attitudes and non-attitudes: Continuation of a dialogue. In E. R. Tufte (Ed.), *The quantitative analysis of social problems*. New York: Addison-Wesley.

Dalsgaard, P., & Halskov, K. (2010). Designing urban media façades: cases and challenges. In *The ACM CHI Conference on Human Factors in Computing Systems*, ACM Press (pp. 2277–2286).

Day, N., Sas, C., Dix, A., Toma, M., Bevan, C., & Clare, D. (2007). Breaking the campus bubble: Informed, engaged, connected. In *The British Computer Society Human Computer Interaction Conference* (pp. 133–136).

De Cindio, F., Di Loreto, I., & Peraboni, C. (2009). Moments and modes for triggering civic participation at the urban level. In M. Foth (Ed.), *Handbook of research on urban informatics: The practice and promise of the real-time city* (pp. 97–113). Hershey, PA: Information Science Reference, IGI Global.

Downs, A. (1956). *An economic theory of democracy*. New York: Harper and Row.

Goncalves, J., Ferreira, D., Hosio, S., Liu, Y., Rogstadius, J., Kukka, H., & Kostakos, V. (2013a). Crowdsourcing on the spot: Altruistic use of public displays, feasibility, performance, and

behaviours. In *The ACM International Joint Conference on Pervasive and Ubiquitous Computing* (pp. 753–762).

Goncalves, J., Kostakos, V., Hosio, S., Karapanos, E., & Lyra, O. (2013b). IncluCity: Using contextual cues to raise awareness on environmental accessibility. In *The ACM SIGACCESS International Conference on Computers and Accessibility* (article 17).

Goncalves, J., Kostakos, V., Karapanos, E., Barreto, M., Camacho, T., Tomasic, A., & Zimmerman, J. (2013c). Citizen motivation on the go: The role of psychological empowerment. *Interacting with Computers*, online first.

Harper, R. (2011). *Texture: Human expression in the age of communication overload*. Cambridge, MA: MIT Press.

Hirschmann, A. O. (1982). *Shifting involvements: Private interest and public action*. Princeton, NJ: Princeton University Press.

Hosio, S., Goncalves, J., & Kostakos, V. (2013). Application discoverability on multipurpose public displays: Popularity comes at a price. In *The International Symposium on Pervasive Displays*

Hosio, S., Vassilis, K., Kukka, H., Jurmu, M., Riekki, J., & Ojala, T. (2012). From school food to skate parks in a few clicks: Using public displays to bootstrap civic engagement of the young. In *The International Conference on Pervasive Computing* (pp. 425–442).

Huang, E. M., Mynatt, E. D., & Trimble, J. P. (2007). When design just isn't enough: The unanticipated challenges of the real world for large collaborative displays. *Personal and Ubiquitous Computing, 11*(7), 537–547.

Kindberg, T., Spasojevic, M., Fleck, R., & Sellen, A. (2005). The ubiquitous camera: An in-depth study of camera phone use. *IEEE Pervasive Computing, 4*(2), 42–50.

Korn, M., & Bødker, S. (2012). Looking ahead—How field trials can work in iterative and exploratory design of ubicomp systems. In *ACM Conference on Ubiquitous Computing* (pp. 21–30)

Kostakos, V., Kukka, H., Goncalves, J., Tselios, N., & Ojala, T. (2013). Multipurpose public displays: How shortcut menus affect usage. *IEEE Computer Graphics and Applications, 33*(2), 56–63.

Kuikkaniemi, K., Jacucci, G., Turpeinen, M., Hoggan, E., & Müller, J. (2011). From space to stage: How interactive screens will change urban life. *Computer, 44*(6), 40–47.

Kukka, H., Kostakos, V., Ojala, T., Ylipulli, J., Suopajärvi, T., Jurmu, M., & Hosio, S. (2012). This is not classified: Everyday information seeking and encountering in smart urban spaces. *Personal and Ubiquitous Computing, 17*(1), 15–27.

Mohammadi, S. H., Norazizan, S., & Shahvandi, A. R. (2011). Civic engagement, citizen participation and quality of governance in Iran. *Journal of Human Ecology, 36*(3), 211–216.

Montero, M. (2004). *Introducción a la psicologia comunitaria*. Buenos Aires, Argentina: Paidos.

Müller, J., Alt, F., Michelis, D., & Schmidt, A. (2010). Requirements and design space for interactive public displays. In *The International Conference on Multimedia*, ACM Press.

Munson, S. A., Rosengren, E., & Resnick, P. (2011). Thanks and tweets: comparing two public displays. In *Computer supported cooperative work and social computing*, ACM Press (pp. 331–340).

Nonnecke, B., & Preece, J. (2000). Lurker demographics: counting the silent. In *The ACM CHI Conference on Human Factors in Computing Systems*, ACM Press (pp. 73–80).

Nonnecke, B., & Preece, J. (2001). Why lurkers lurk. In *Americas Conference on Information Systems*.

O'Hara, K., Glancy, M., & Robertshaw, S. (2008). Understanding collective play in an urban screen game. In *The ACM Conference on Computer Supported Cooperative Work and Social Computing*, ACM Press (pp. 67–76).

Ojala, T., Vassilis, K., Kukka, H., Heikkinen, T., Linden, T., Jurmu, M., Hosio, S., Kruger, F., & Zanni, D. (2012). Multipurpose interactive public displays in the wild: Three years later. *Computer, 45*(5), 42–49.

Peltonen, P., Kurvinen, E., Salovaara, A., Jacucci, G., Ilmonen, T., Evans, J., Oulasvirta, A., & Saarikko, P. (2008). It's mine, don't touch!: Interactions at a large multi-touch display in a city centre. In *ACM CHI Conference on Human Factors in Computing Systems*, ACM Press (pp. 1285–1294).

Rogers, Y., Connelly, K., Tedesco, L., Hazlewood, W., Kurtz, A., Hall, R. E., Hursey, J., & Toscos, T. (2007). Why it's worth the hassle: the value of in-situ studies when designing Ubicomp. In *The International Conference on Ubiquitous Computing* (pp. 336–353).

Schroeter, R. (2012). Engaging new digital locals with interactive urban screens to collaboratively improve the city. In *The ACM Conference on Computer Supported Cooperative Work and Social Computing* (pp. 227–236).

Schwarz, O. (2011). Subjectual visibility and the negotiated panopticon: on the visibility-economy of Online Digital Photography. http://scholar.harvard.edu/schwarz/publications/subjectual-visibility-and-negotiated-panopticon-visibility-economy-online-digit

Sharp, R., & Rehman, K. (2005). The 2005 UbiApp workshop: What makes good application-led research? *IEEE Pervasive Computing, 4*(3), 80–82.

Uslaner, E. M., & Brown, M. (2005). Inequality, trust, and civic engagement. *American Politics Research, 33*(6), 868–894.

Van House, N. A. (2007). Flickr and public image-sharing: distant closeness and photo exhibition. In *Extended abstract of ACM CHI Conference on Human Factors in Computing Systems*, ACM Press (pp. 2717–2722).

Wright, S., & Street, J. (2007). Democracy, deliberation and design: The case of online discussion forums. *New Media & Society, 9*(5), 849–869.

Chapter 8
An Implementation of isiXhosa Text-to-Speech Modules to Support e-Services in Marginalized Rural Areas

Okuthe P. Kogeda, Siphe Mhlana, Thinyane Mamello, and Thomas Olwal

1 Introduction

Text-to-speech (TTS) systems are widely used to generate spoken utterances from text to speech (Bickley et al. 1998). TTS system can be used to render text through digital audio. Most speech modules can be categorized by the method they use to translate phonemes into audible sounds (Parssinen 2007). The speech modules used are commercially available in English (e.g., British, United States), some Indian languages (e.g., Hindi, Tamil, and Urdu), French, Spanish, and Swahili. However, there are numerous speech module synthesizers used all over the world but, as far as we are aware, none exists in isiXhosa. This suggests that there is a need to design, develop, and implement a TTS system for people living in marginalized areas of the Eastern Cape Province of South Africa where most isiXhosa speakers live.

There are a number of e-service projects deployed in marginalized areas, which are aimed at improving the standard of living of the inhabitants. However, these projects are all written in English (even if translated in isiXhosa) and some written in isiXhosa, which makes it difficult for illiterate people to consume them because, in rural areas, the majority of the people from the community cannot read and

O.P. Kogeda (✉)
Department of Computer Science, Faculty of Information Communication Technology, Tshwane University of Technology, Pretoria, South Africa
e-mail: kogedapo@tut.ac.za

S. Mhlana • T. Mamello
Department of Computer Science, University of Fort Hare, Alice, South Africa

T. Olwal
Council for Scientific and Industrial Research (CSIR), Pretoria, South Africa

S. Saeed (ed.), *User-Centric Technology Design for Nonprofit and Civic Engagements*, Public Administration and Information Technology 6, DOI 10.1007/978-3-319-05963-1_8,

write in their mother tongue, which is isiXhosa. It is difficult for isiXhosa speakers living in rural areas to access information from the internet because of the language and illiteracy barrier. There is a need to develop an application that can convert isiXhosa text into isiXhosa speech to improve the use of computers and consumption of information for development in rural areas, particularly in the Eastern Cape Province.

This chapter seeks to develop and implement a TTS platform that can help people who cannot read and write in isiXhosa, but who are able to speak it. The system was implemented using Festival speech synthesis and MySQL database. The system seeks to improve ICT4D e-services' usability through the development of an isiXhosa TTS system.

This chapter is organized as follows. In Sect. 2, we provide the background of text to speech. We present related work in Sect. 3. In Sect. 4, we present system design and architecture. In Sect. 5, we present implementation and in Sect. 6, we present system testing and results. We conclude the chapter in Sect. 7.

2 Background of Text to Speech

Christian Kratzenburg built the first TTS system in 1779 (Conkie 1999). The system was able to produce five long vowels such as *a*, *e*, *i*, *o*, and *u* sounds using resonators-activated application. This system led to numerous TTS applications that are being used today. There are three main techniques that were used to implement this system: articulatory synthesis, formant synthesis, and concatenative synthesis (Conkie 1999).

Human articulators such as tongue and teeth are articulatory synthesis techniques used to speak and produce vocal cords. This method allows the changes to occur in the vocal tract so that it produces an accurate utterance; however, articulatory synthesis is very difficult to implement and is very rarely used in practice. Formant frequencies of human speech are modeled using formant synthesis, which contains a number of sounds making it more flexible as advantage. It is also easy to adjust and integrate with other methods of speech synthesis; however, it is still difficult to get full natural sounding speech.

The technique that produces more natural sounding speech is concatenative synthesis. It uses a prerecorded voice from a language that is being implemented (Rousseau and Mashao 2004). The first practical application of speech synthesis was in 1936 when the United Kingdom (UK) Telephone Company introduced a speaking clock. It used optical storage for the phrases, words, and part-words which were appropriately concatenated to form complete sentences. After 1936, Homer Dudley at Bell Labs (Juang and Rabiner 2004) developed a mechanical device that worked using pedals and machine keys. When you are moving the pedals they cause a sound like human speech. The machine was called VODER (Voice Operating Demonstrator), which worked like an organ to generate almost all recognizable speech. The VODER application was demonstrated in New York and San Francisco to test whether it can produce a sound like that of a human being. Much of the work in

this field was primarily concerned with constructing the signal rather than generating the phones from some higher form, like text.

In the early 1970s the standard UNIX manual included commands to process the TTS system, form text analysis, prosodic, phoneme generation, and waveform synthesis through a specialized piece of hardware. UNIX had only about 16 installations at the time and most were located in Bell Labs at Murray Hill. Techniques were being developed to compress speech in a way that it could be more easily used in applications. The Texas Instruments Speak 'n Spell toy, released in the late 1970s, was one of the earlier examples of mass production of speech synthesis. The quality was poor but, at the time, it was very impressive. Speech synthesis was basically encoded using LPC (linear predictive coding) and it used, primarily, isolated words and letters although there were also a few phrases formed by concatenation. The simple TTS system, based on specialized chips, became popular on home computers, such as the BBC (British Broadcasting Corporation) Micro in the UK and Apple. It was later developed into a product of DECTalk, which produces a somewhat robotic but very understandable form of speech. Before 1980, speech synthesis research was limited to large laboratories that could afford to invest time and money for hardware. By the mid-1980s more labs and universities started to join in as the hardware costs dropped. By the late 1980s purely software synthesizers became feasible; they not only produced reasonable quality speech but could also do so in near real time.

Yoshinori Sagisaka at Advanced Telecommunications Research (ART) in Japan developed nuu-talk nuutalk92 in the late 1980s and early 1990s (Black 2000a, b); this used much larger inventories of concatenative units. Thus, instead of one example of each diphone unit, there could be many and an automatic acoustic-based selection was used to find the best selection of sub-word units from a fairly general database of speech (Black 2000a, b). Synthesized speech must be natural, controllable, and efficient both in the rendering and in the building of new voices (Black 2000a, b).

The goal of TTS synthesis is to convert arbitrary input text to intelligible and natural sounding speech so as to transmit information from a machine to a person or enable the automatic conversion of a sequence of type-written words into their spoken form (Bickley et al. 1998). According to Rousseau and Mashao (2004), a TTS system, in the simplest words, is the conversion of text to a speech output using a computerized system. It therefore allows for communication between humans and machines through synthetic speech (Rousseau and Mashao 2004). Currently, many speech synthesis systems are available in most major languages such as English, Japanese, French, Spanish, Russian, Italian, Marathi, Telugu, Czech, Finnish, and Hindi and successful results are obtained in various application areas (Black et al. 1998). However, thousands of the world's minor languages, such as isiXhosa, lack such technology and researchers in the area are scarce. According to Tadesse and Takara (2006), TTS synthesis is a process which artificially produces synthetic speech for various applications such as services over the telephone, e-document reading, and a speaking system for handicapped people. The methodology used in the TTS system is to exploit acoustic representations of speech for synthesis, together with the linguistic analysis of text to extract correct pronunciations (context, what is being said), and prosody in context (melody of a sentence, how it is being said) (Schroeter 1996).

Synthesis systems are commonly evaluated in terms of three characteristics including accuracy of rendering the input text (does the TTS system pronounce, e.g., acronyms, names, URLs, and e-mail addresses, as knowledgeable human would?), intelligibility of the resulting voice message (measured as a percentage of a test set that is understood), and perceived naturalness of the resulting speech (does TTS sound like a recording of a live human?) (Schroeter 1996).

The TTS system converts text by taking it through phonetic analysis, where graphemes are converted into phonemes of the language and then final information is used to generate the speech signal. The text can be words, sentences, numbers, and abbreviations. During text analysis phase, text normalization takes place, where texts such as numbers and symbols become words; abbreviations are replaced by the corresponding words (David et al. 2009). During phonetic analysis stage, symbols are converted into phonological symbols using a phonetic alphabet, i.e., International Phonetic Association (IPA). This IPA contains the phonemic symbols which are related to pronunciation. The grapheme-to-phoneme conversion is defined in this stage in which graphemes are converted into phonemes (Yvon et al. 1998). These components of TTS architecture are shown in Fig. 8.1.

Prosody is a concept which controls the naturalness of a speech by controlling stress patterns and the intonation process. This process plays a very important role in understanding speech; for instance, it checks and identifies the emotional state of a speaker and the background noise. Prosody is responsible for the natural sounding of the TTS system by changing pitch and stress from the vowels and consonants. Speech synthesis is the final stage of the TTS system, which generates the speech signal.

2.1 Text-to-Speech Engines

The following are some of the TTS engines:

- Festival Speech Engine—It is a free, open source software for multilingual speech synthesis that runs on multiple platforms offering black box TTS, as well as open architecture for research in speech synthesis. It offers full TTS conversion. It was developed at the Centre for Speech Technology Research (CSTR) at the University of Edinburgh (Black et al. 1998).
- Flite Speech Engine—It is a small, fast, portable run-time synthesis engine, which was developed at Carnegie Mellon University (CMU). It is primarily designed for small embedded machines and large servers. Flite is designed as an alternative engine to Festival for various voices built using the Festvox suite of voice building tools. It is also designed as an alternative run-time synthesis platform for Festival in applications where speed and size are important. It is written entirely in C language. Flite is compatible with Festival speech synthesis and is not a replacement but a companion. It gives the same quality of voice as Festival but uses a small database and the voice gets compiled into a static structure. This type of engine uses no scheme, no interpreter, and no gc compiler, like

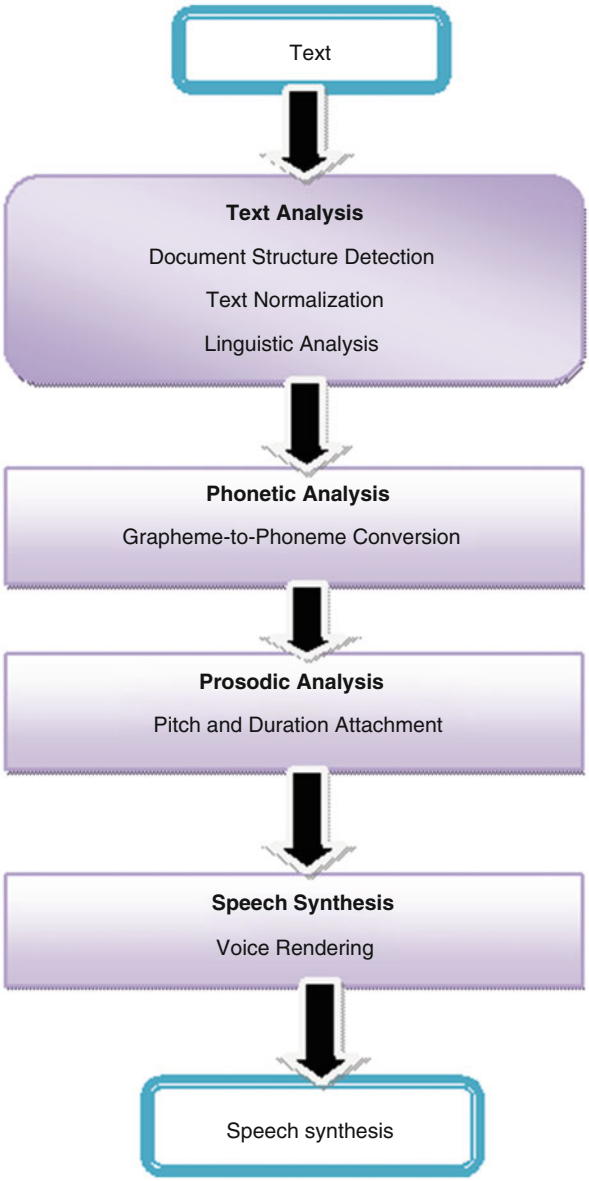


Fig. 8.1 Text-to-speech architecture

Festival. The difference between Flite and Festival speech synthesis is that Festival is too slow, too big, and lacks portability, when compared to Flite speech engine. Flite links voice with each utterance, voice is global (constant), and voice is linked to each synthesis function (e.g., appropriate text analysis, F0 model functions and appropriate models, and duration cart). Voice built using Festvox process may

be compiled into efficient representation that can be linked against Flite to produce complete TTS synthesizers. The system is free software (Black 2000a, b).

- eSpeak Speech Engine—It is an open source, Graphical User Interface (GUI) program, which is used to prepare and compile phoneme data. eSpeak uses a formant synthesis method to create a voice. eSpeak is available, as a command line (Linux and Windows), to speak text from a file and a shared library version for use by other programs. eSpeak is regarded as one of the good speech synthesizers because it offers one a natural voice, but in a small size of a database. It also allows us to change the pitch and speed of the speech and support various languages and voices.

2.2 Applications of Speech Synthesis

Speech synthesis has been applied in many different areas, including (Klatt 1987; Black 2000a, b):

- The blind people—it is used to read text for the blind and for communication purposes.
- Education—TTS systems are used in many educational programs to teach students, i.e., they are used in schools for the blind and deaf, teaching spelling and pronunciation.
- Telecommunication and multimedia—synthesized speech has been used for decades in all kinds of telephone enquiry systems.
- Illiterate people—TTS systems are used to help illiterate people, for communication purposes.

2.3 ICT in Marginalized Rural Areas

Information and communication technology (ICT) is an umbrella term that includes any communication device or application; it encompasses radio, television, cellular phones, computer and network hardware and software, satellite systems, and so on. In addition, the various services and applications associated with them, such as videoconferencing and distance learning (Martha 2006), are also categorized under the term ICT. Bakar and Wee (2006) defines ICT as a diverse set of technological tools and resources used to communicate and to create, disseminate, store, and manage information.

According to Cooperation Framework on Innovation Systems Between Finland and South Africa [COFISA] (2008), ICT is a collective term referring to new and old technology that facilitates the processing and transfer of information across space and time. The older communication technologies such as newspapers, radio, and TV offer considerable unrealized potential. The new technologies, such as

mobile phones and the internet, also have great potential to support the achievement of major development goals. These advantages include interactive forms of communication and low cost access to sources of lifesaving information (Curtain 2003).

South African rural communities are still living under the subsistence level of having no access to the basic infrastructure essential for economic growth and development. This results in the movement of the youth from rural areas to urban areas, in search of employment opportunities (Acacia 2000; Vusani and Kogeda 2012; Malusi and Kogeda 2013). ICT is a catalyst in rural development, because it helps in achieving (COFISA 2008) poverty alleviation in rural areas; developing local economies in rural areas; achieving basic standards of health, safety, and other developmental infrastructure and services in rural areas; encouraging and enabling rural people to invest in themselves and their communities; cultural regeneration, including the development and integration of indigenous knowledge systems into a rural community's ways of doing things and learning; and long-term sustainability of livelihoods and improvements in quality of life.

ICT4D is based on three concrete notions: access (equal opportunities), networking (communication and organization), and voice (participation in democratic process, good governance, cultural diversity, and local content) (Weigal et al. 2004).

2.4 ICT Usage in Marginalized Rural Areas

In this chapter, we present a case study of accelerating ICT usage in Dwesa, which is in Eastern Cape Province of South Africa. Siyakhula Living Lab has deployed a number of e-services in the area aimed at improving the standard of living of the inhabitants. However, these e-services cannot be consumed by the community because of language barrier and illiteracy. Language hinders the use of these tools because the tools are not written in English which is not the mother tongue of the people living in Dwesa. Even if the language can be translated into isiXhosa using Google translator, illiteracy is still a hindrance, which this work seeks to give a solution by developing isiXhosa TTS system. These ICT tools have become themselves a digital divide among the community members, between those who can read and write and those who cannot; other members feel like the ICT tools were deployed for educated people. Some of the people cannot read and write in their mother tongue (isiXhosa); these people are considered to be illiterate. For these people it is far impossible for them to use ICT tools which are written in English while they cannot even read and write isiXhosa, the language they use to communicate.

The infrastructure, i.e., electricity, storage facilities, etc., is another thing which hinders the use of ICT tools in marginalized rural areas. Therefore, this work seeks to help illiterate people, who cannot read and write in isiXhosa, to be able to consume and use ICT services. It also improves the usability of computers in marginalized rural areas because it draws all people to ICT tools and improves their skills.

Table 8.1 isiXhosa alphabet pronunciation

A	b	bh	d	Dl	dy	E	en	f	g	gr	h
Hl	i	j	k	Kh	kr	L	l	m	mbh	n	nd
Ndl	ndy	ng	ng'	Nj	ntsh	Ng	o	p	ph	r	rh
Ndl	sh	t	th	Tl	tsh	Ty	u	v	w	y	z

Table 8.2 isiXhosa click consonants

C	ch	Ge	Ne	nge	nke
Q	qh	Gq	Nq	ngq	nkq
X	xh	Gx	Nx	ngx	nkx

2.5 Overview of IsiXhosa

IsiXhosa is one of the 11 official languages of South Africa, which include English, Afrikaans, isiNdebele, Southern Sotho, isiZulu, Sepedi, Tshivenda, Setswana, siSwati, and Xitsonga. IsiXhosa is a tonal language, which is marked by a number of tongue-clicking sounds. It is derived from the Koisan language. IsiXhosa employs click sounds in the pronunciation of consonants, such as c, q, and x, which were most likely borrowed from the Koisan language as a result of long and extensive interaction between the Xhosa and Koisan people. The isiXhosa alphabet was written with the Latin as shown in Tables 8.1 and 8.2.

According to South African statistics (Census 2001), isiXhosa is the second most spoken language after isiZulu in South Africa and it is spoken by 83.4 % of population of the Eastern Cape as their mother tongue. There are many Xhosa people who are living in other provinces such as the Western Cape, which consists of 13.6 % of isiXhosa speakers. There are a few isiXhosa speakers in other provinces such as the Free State which consists of 9.1 % isiXhosa speakers, while the North West consists of 5.8 % and Gauteng boasts a 7 % of isiXhosa speaking population.

3 Related Work

A lot of work has been done in this area of research. There are many uses for TTS systems; these include digital actors, avatars, and digitized speech (in conjunction with speech recognition and possibly a translator), as well as next generation chat applications. As such there is a lot of research in the area. These include:

Whistler TTS (Windows Highly Intelligent Stochastic taLkER): It was developed by Microsoft in 1998 and used commercially in a number of their applications including Narrator as part of Windows 2000 and XP. The overall quality of the speech is not great and it sounds like the typical talking computer. The system is designed to produce synthetic speech that sounds natural and resembles the acoustic and prosodic characteristics of the original speaker; the results have been quite promising (Huang et al. 1996, 1997; Acero 1998). The speech engine is based on concatenative synthesis and the training procedure on Hidden Markov

Models (HMM) (Hon et al. 1998). The project originally proposed a novel voice training system. Unfortunately, this research appears to have been discontinued and no information about the training was released. The present system has no facilities to make new voices (Hood 2004).

Sanosse TTS synthesis: It is another system that has been developed, originally for educational purposes for the University of Turku. The system is based on concatenative synthesis and is available for Windows 3.1/95/NT environments. The adjustable features are the speech rate, word emphasis, and pauses between words. The input text can also be synthesized letter-by-letter, word-by-word, or even syllable-by-syllable. The feature can also be controlled with control characters within a text. Sanosse synthesis is currently used in aLexis software which is developed for computer-based training for people with reading difficulties (Hakulinen 1998). The original Sanosse system is also adopted by Sonera for their telephony applications.

SoftVoice Text-To-Speech: Developed by SoftVoice-Inc, it was first written in 1979 and is now released as a set of Windows DLLs to enable programmers to easily add speech synthesis capabilities to their products. SoftVoice provides decent voice quality, but lacks any programs or documentation on how to create a new voice. The speech quality of SoftVoice is probably not the best of the available products but, with the large number of control characters and different voices, it is very useful for several kinds of multimedia applications (Hood 2004).

HADIFIX Text-To-Speech (HAlbsilben, Diphone, Suf-FIXE): It is a TTS system for Germans, developed at the University of Bonn, Germany. The system is available for both male and female voices and supports control parameters, such as duration, pitch, word prominence, and rhythm. The insertion of pauses and accent markers into the input text and the synthesis of the singing voice are also supported. The system is based on the concatenation of demisyllables, diphones, and suffixes (Portele et al. 1991, 1992, 1994; Portele and Krämer 1996).

Lucent TTS engine: It was developed by Bell Laboratories and used in own telecommunication and messaging products. It is available to other developers. The system works primarily within the context of a telephone system. Natural Voices is an ongoing research project at AT&T (Hood 2004).

Laureate Text to Speech: It is developed at BT (British Telecom) Laboratories to achieve good platform independence. It is written in standard ANSI C (Gaved 1993; Morton 1987) and optimized for telephony applications so that a significant amount of attention is paid to the fields of text normalization and pronunciation.

DECTalk, Digital Equipment Corporation (DEC) Text to Speech (Hallahan 1996; Waters and Levergood 1993): It has one of the best designed text preprocessing and pronunciation controls. The system is capable of saying most proper names, and e-mail and URL addresses and supports a customized pronunciation dictionary. It also has punctuation controls for pauses, pitch, and stress, and the voice control commands may be inserted in a text file for use by DECTalk software applications. In addition, the generation of single tones and DTMF (Dual Tone Multi Frequencies) signals for telephony applications is supported.

Black and Taylor developed a TTS system at the CSTR. It was used in reading systems for the blind; in these systems, the system would read some text from a book and convert it into speech. The current system is available for American and British English, Spanish, and Welsh. The system is written in C++ and supports residual-excited LPC and PSOLA methods and MBROLA database. With the LPC method, the residuals and LPC coefficients are used as control parameters. As a university program, the system is available free-of-charge for educational, research, and individual use (Black et al. 1998). However, in this work we propose the use of isiXhosa language.

Alam developed a TTS system at the BRAC University in Bangladesh for Bangla speakers. It targeted illiterate people, the visually impaired, and people who cannot read the Bangla language (Alam et al. 2007). However, the system was developed for Bangla speakers who have different speech and life orientation forms to South African people.

Gakuru, at the University of Nairobi in Kenya, developed a TTS system for Swahili speakers (Gakuru and Ngugi 2005). The system is being used by Microsoft and Google. It was also used by a large number of blind children in schools to communicate. However, Swahili system was developed for commercial purposes and meant for Swahili speakers.

Barnard developed a TTS system for the isiZulu language. The development was aimed at fostering an understanding of the challenges involved in developing a TTS engine for a Nguni language; it consisted of two phases. Initially, a fairly primitive synthesizer was developed using a limited set of sentences and an early version of components, such as a letter-to-sound converter, was used (Barnard et al. 2005).

Bosch developed an open source TTS system for isiZulu speakers (Bosch 2009). Mashao developed the TTS synthesis for Afrikaans language that was based on diphones (Mashao and Rousseau 2005). Bali developed a Hindi TTS system (Bali 2004).

4 System Design and Architecture

The system design consisted of back end and front end. The back end involves a database that stores the vocabulary of isiXhosa language. The entity relationship diagram is shown in Fig. 8.2.

The front end was implemented using Festival schema script, forming the user interface and providing platform for rules implementation. The system was designed with three kinds of users in mind namely *Administrator*, *Community members*, *and Students*. The administrator functionalities are shown in Fig. 8.3.

Community members do interact with the system and may familiarize themselves by playing with the system, among others as shown in Fig. 8.4. The students may also perform the same functions and interact with the system the same way as community members.

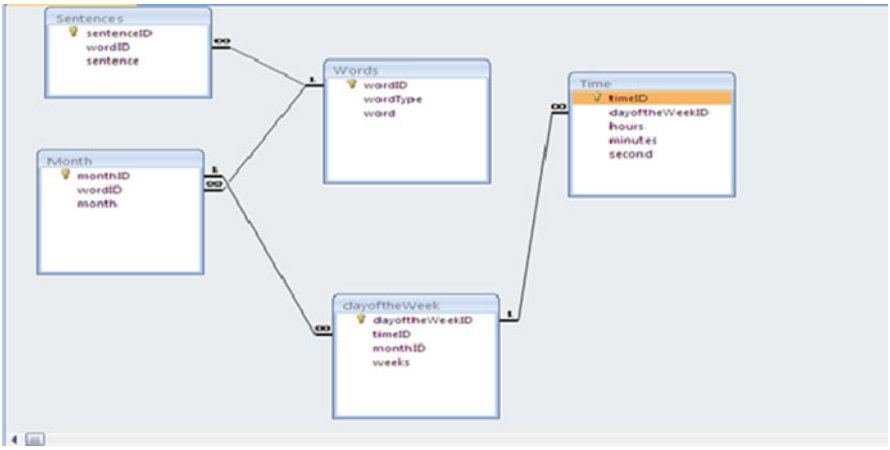


Fig. 8.2 Entity relationship diagram

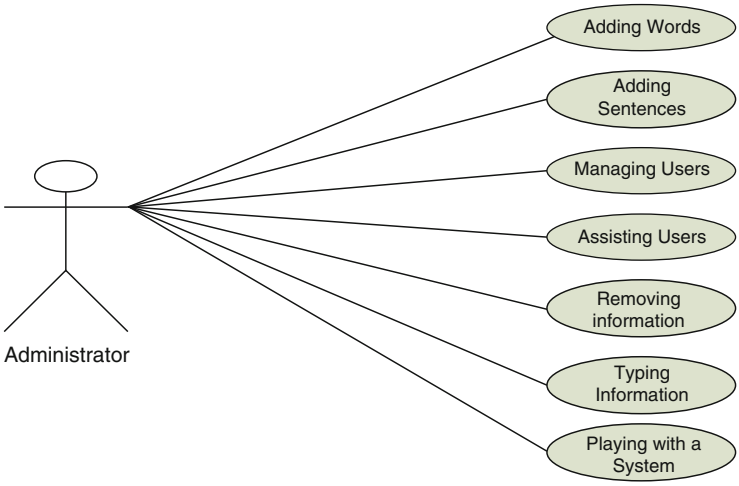


Fig. 8.3 Administrator use case diagram

4.1 System Architecture

The system architecture showing the connection between isiXhosa modules and e-services implemented in Dwesa is shown in Fig. 8.5. We have client (PC or mobile phone), web server, and database server forming the network infrastructure. The desktop is used as a device to transmit information into an e-service web server via Hypertext Transfer Protocol (HTTP). HTTP was used to send a request and transmit

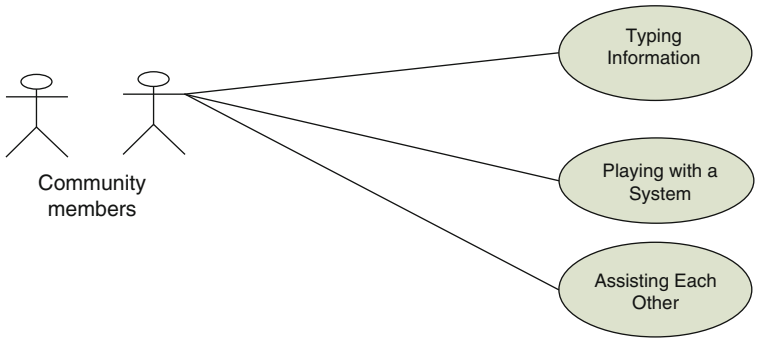


Fig. 8.4 Community members use case diagram

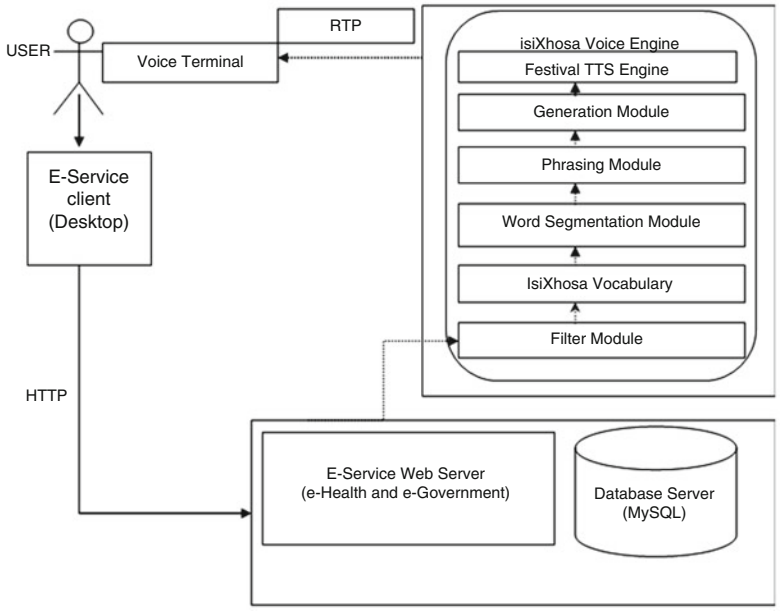


Fig. 8.5 System architecture

files into a web server and MySQL database. Filter Module is used to filter data sent or received by the server. IsiXhosa vocabulary module contains isiXhosa words and sentences. Word segmentation module is used to tokenize a string of text into words. Phrasing module is used to find out the boundaries of phrases. The phrasing module usually checks the beginning and the end of the sentence. Generation module is used to produce waveforms from the words in a database or from the isiXhosa vocabulary. This module generates waveforms as an output of the TTS system.

5 Implementation

The isiXhosa TTS system was implemented using the Festival speech synthesis scheme, which includes modules such as phoneset, intonation, and phrasing. These modules were connected to the database so that they can use words and sentences from the database. Most functionalities of the system were implemented with the involvement of teachers, students, and community members of Dwesa community to increase acceptability and adoption of the system.

The system was implemented in three phases including:

- Recording of voice phrases and words was done using isiXhosa male speaking person.
- Database—we used MySQL database. This is because it is open source, easy to use, and it's good for scalability and performance. Created TTS_db database, which consists of five tables, namely words, sentence, month, days, and time.
- Festvox—we used Festvox to build synthetic voice for Festival speech, to produce natural sounding voice.

The TTS_db database consists of the following tables.

5.1 Words Table

This table stores information about the isiXhosa words. Some of these words have clicks, while some are voiceless and unvoiced words. We stored more than 5,000 words in this table for the purposes of this study as shown in Fig. 8.6.

5.2 Sentence Table

This table stores common isiXhosa sentences used in marginalized rural areas as shown in Fig. 8.7.

5.3 Month Table

This table stores information about the month of the year, written in isiXhosa as shown in Fig. 8.8.

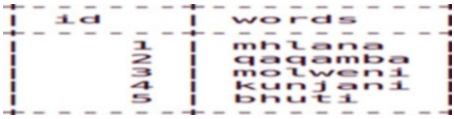
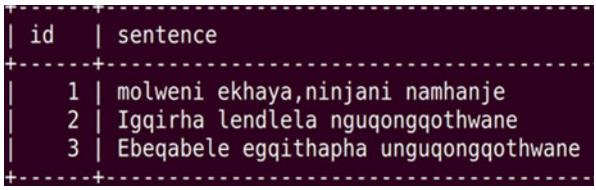


Fig. 8.6 Words table

Fig. 8.7 Sentences table



id	sentence
1	molweni ekhaya,ninjani namhanje
2	Igqirha lendlela nguqongqothwane
3	Ebeqabele egqithapha unguqongqothwane

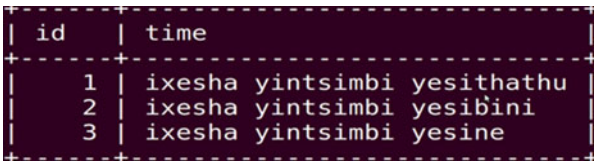
Fig. 8.8 Month table

id	month
1	EyoMqungu
2	EyoMdumba
3	EyoKwindla

Fig. 8.9 Days of the week

id	days
1	uMvulo
2	uLwesibini
3	uLwesithathu

Fig. 8.10 Time table



id	time
1	ixesha yintsimbi yesithathu
2	ixesha yintsimbi yesibini
3	ixesha yintsimbi yesine

5.4 Days of the Week Table

This table stores information about the days of the week as shown in Fig. 8.9.

5.5 Time Table

This table stores information related to time of the day as shown Fig. 8.10.

5.6 Festvox

Festvox contains the suite of tools that are used to build a synthetic voice for Festival speech synthesis. In other words, Festvox works under Festival in order to produce a natural sounding voice. The implementation of Festvox includes more modules of speech synthesis such as phoneset and duration. These modules were implemented so that a natural sounding voice should become an output at the end of the development of the system. The listing that was created to link other modules is shown in the code listing below.

```
(defvar ufh_isiXhosa_siphe_diphone_dir
(cdr (assoc 'ufh_isiXhosa_siphe_diphone voice-locations))
  "ufh_isiXhosa_siphe_diphone_dir
  The default directory for the ufh isiXhosa siphe diphone database.")
(set! load-path (cons (path-append ufh_isiXhosa_siphe_diphone_dir
"festvox/") load-path))
(require 'radio_phones)
(require_module 'UniSyn)
;; set this to lpc or psola
(defvar ufh_isiXhosa_siphe_diphone_sigpr 'lpc)
```

5.7 Phoneset Module

Phoneset is a set of symbols which may be further defined in terms of their features, such as vowels and consonant. This module aids in understanding and interoperability among the modules thereby producing a natural sounding voice. Phoneset was defined as follows:

```
(defPhoneset
  NAME
    FEATUREDEFS
PHONEDEFS
)
```

5.8 Letter-to-Sound Module

This module is responsible for the determination of the phonetic transcription of the coming text. It was difficult to implement this module because the isiXhosa language has some words that correspond to several entries in the dictionary, but with different pronunciations. The letter-to-sound (LTS) rule was implemented as a backup so that when the word is not in the database, it just constructs the word from the existing vowels and consonants from the database. Since the system fails to pronounce it if it is not in the database, the LTS is there to generate that word.

5.9 Phrasing Module

In order for a phrasing module to work properly the database needed to be well labeled. This module involved different types of trees that were implemented to denote the end of the utterance. The code listing below shows how the CART tree was implemented to predict a simple break due to punctuation:

```
(set! isiXhosa_phrase_CART_tree
      „((lisp_token_end_punc in ("?" "." ":"))
        ((BB))
            ((lisp_token_end_punc in ("'" "\" "," ";"))
              ((B))
            ((n.name is 0);; end of utterance
       ((BB))
  ((NB))))))
```

5.10 Intonation Analysis

This module was implemented solely to determine a tone or pitch contour from the vowels and consonants, or from isiXhosa sentences. The end result of determining the tone was that, in the isiXhosa language, tone rises in a question and drops down at the end of a statement.

5.11 Duration Parameter Module

Since Festival speech synthesis has different types of tree methods, the prediction of speed from vowels and consonants, the zscores tree, was used to make this module successful.

5.12 Fundamental Frequency (F0) Generation

This module was implemented for the isiXhosa language in order to predict the pitch and accent of the language. It improves the quality of the speech synthesis of the isiXhosa language. F0 module is divided into statistical and rule-based approaches.

5.13 Waveform Generation Module

The waveform module uses a prerecorded voice of the language that is being developed. The TTS system for isiXhosa was implemented using a concatenative approach which results in the very natural sounding voice of the system. This is the final stage of TTS architecture which produces the output as a speech.

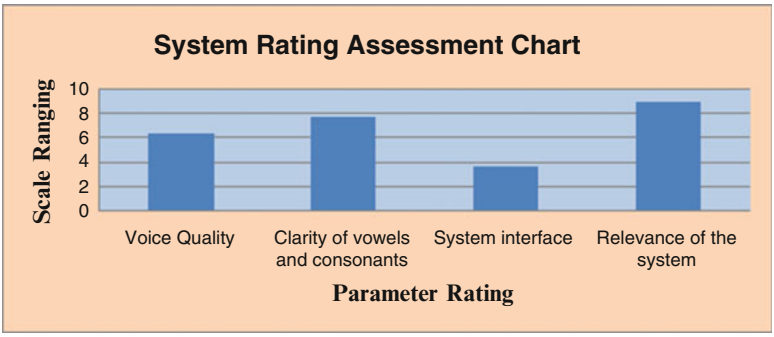


Fig. 8.11 System rating assessment chart

6 Testing and Results

After the system implementation, we conducted system and usability testing. The impact of the system was quantified using questionnaires, which captured the following aspects:

- The quality of voice produced by the system
- The clarity of vowels and consonants from various text supplied to the program
- System interface
- The relevance of the system to the needs of the community

We got response from 120 users (testers) based on the above parameters. Users were asked to rate the parameters on a scale from 1 to 10, where 10 means excellent and 1 means very poor. The result of this test is shown in Fig. 8.11.

According to the analysis of the results of users' responses to the questionnaire, 89 % of the respondents appreciated the relevance of the system to their needs. This was evident even during training as most of them kept trying various isiXhosa words and sentences in order to generate the associated sounds. It was also interesting to note that the majority of the test subjects acknowledged the fact that the program produced nearly the exact sounds of the vowels and consonants of the text used with 77 % rating. However, they complained about the low quality of voice due to computer accessories, like the speakers used with 63 % rating. The system interface was met with low tolerance levels with approval rating of 36 %. This was due to the use of the unfriendly command line interface. However, with more training and practice the testers eventually became familiar with the system environment.

6.1 System Training

The system was trained in such a way that one word or a sentence was repeatedly tested over 20 times making a total of over 1,500 times of training to check how accurate the system is. The words and sentences used in the training are shown in

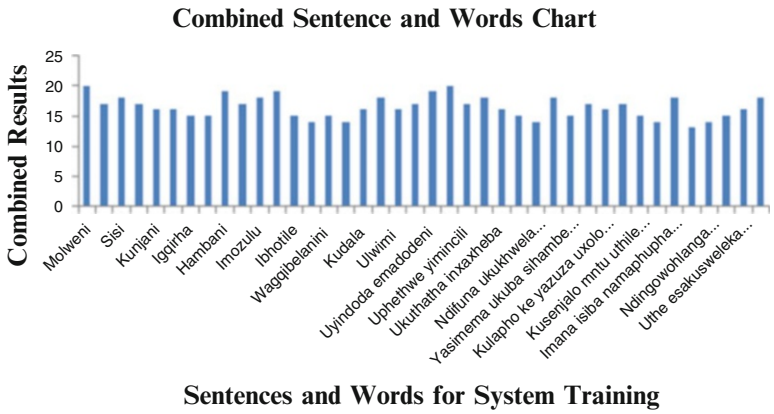


Fig. 8.12 Combined results of the system training

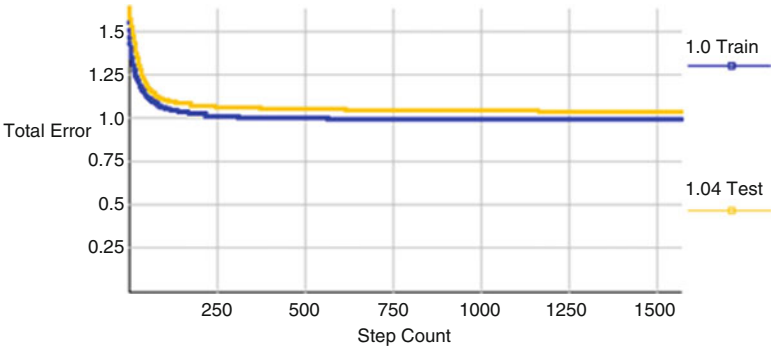


Fig. 8.13 Errors occurrence during training of words and sentences

Fig. 8.12. The word *Molweni* (hello in English) was pronounced all the times correctly; it pronounces *bhuti* (brother) incorrectly for the first three attempts with a tone where it removed *h* from *bhuti* but thereafter it pronounces the word correctly. This was as a result of phoneset having *b* and *bh* consonants, which confused the system. The word *sisi* (my sister) initially was incorrectly pronounced by the system putting *h* in front of *s* and pronounced it as *shishi*. The *qaqamba* was pronounced perfect except that the system sometimes instead of *qaqa* put *khakha* during initial rounds of training. The consonants *nj* and *ny* were sometimes being confused by the system, i.e., *kunjani* and *nyani*, which sometimes was hard to hear the difference between the two words. The training of words and sentences continued and followed the same trend for most of the words and sentences used. Because of this, initially we got lots of errors in our training, which later subsided and stabilized as shown in Fig. 8.13.

The training results show that 85 % of words and sentences that were entered into the system were successfully converted into speech and pronounced correctly as shown in Fig. 8.13.

7 Conclusion

In this chapter, we presented TTS system design and implementation to be used by Dwesa community in Eastern Cape Province of South Africa to convert isiXhosa text into speech. We collected commonly used words and sentences from the community and isiXhosa dictionary and developed a vocabulary, which we stored in MySQL database with a corresponding pronunciation sound. We used Festival speech synthesis and MySQL database, both open sources for implementation of the system. We conducted usability testing and got a positive response from the community and the results show that ICT services consumption improved with TTS system. We tested the system to determine the error rates by training the system for over 1,500 times with isiXhosa words and sentences. We achieved 85 % success rate of converting and pronouncing isiXhosa words and sentences correctly. In future, we intend to add more words into the database and conduct more training to improve the success rate of converting and pronouncing isiXhosa words and sentences correctly.

References

Acacia. (2000). *Information and communication technologies (ICTs) for improved service delivery in the new South Africa*. Retrieved September 15, 2010, from http://www.citizens.csir.co.za/

Acero, A. (1998). Source-filter models for time-scale pitch-scale modification of speech. In *Proceedings of ICASSP98*.

Alam, F., Nath, K. P., & Khan, M. (2007). *Text to speech for Bangla language using festival*. Bangladesh: BRAC University.

Bakar, Z. A., & Wee, M. C. (2006). Obstacles towards the use of ICT tools in teaching and learning of information systems in Malaysian universities. *The International Arab Journal of Information Technology, 3*(3), 203–209.

Bali, K., Talukdar, P. P., Krishna, N. S., & Ramakrishnan, A. G. (2004). Tools for the development of a Hindi speech synthesis system. *5th ISCA Speech Synthesis workshop*, *Pittsburgh*, *USA*, 109–114.

Barnard, E., et al. (2005). *A general-purpose isiZulu speech synthesizer: human language technologies research group*. Pretoria, South Africa: Meraka Institute.

Bickley, C., Syrdal, A., & Schroeter, J. (1998). Speech synthesis. In J. M. Picket (Ed.), *The acoustics of speech communication: The fundamentals, speech perception theory, and technology*. Boston: Allyn and Bacon. ISBN 13: 9780205198870.

Black, A. (2000a). *Speech synthesis in festival: A practical course a making computer talk*, edition 2.0, for Festival version 1.4.1.

Black, A. W. (2000b). *Flite: small run-time synthesizer: language technologies institute Carnegie Mellon University*. Retrieved from http://cmuflite.org

Black, A., Taylor, P., & Caley, R. (1998). Edinburgh University, Center for Speech Technology Research. Retrieved March 4, 2010, from http://www.cstr.ed.ac.uk/projects/festival/

Bosch, S. (2009). *An African language is the writing on the screen*? Retrieved May 2010, from http://www.merak.org.za/hlt_projects.htm

CENSUS. (2001). *Statistics South Africa*. Retrieved October 2010, from http://www.statssa.gov.za/census01/html/default.asp

Conkie, A. (1999). Robust unit selection system for speech synthesis. In *Proceedings of the Joint Meeting of ASA, EAA and DEGA*, Berlin, Germany, March 1999.

Cooperation Framework on Innovation Systems Between Finland and South Africa. (2008). *Using ICTs to optimise rural development*. Retrieved October 2010, from www.cofisa.org.za

Curtain, R. (2003). *Information and communications technologies and development: Help or hindrance?* Melbourne, Australia: Kamran Jebreili Associated Press, Curtain Consulting.

David, V. S., David, O. C., & Pallares. (2009). Adaptation of voice server to automotive environment.

Festival speech synthesis system—24 voices. Retrieved September 2010, from http://www.e-insite.net/eb-ag/index.asp?layout=article&articleId=CA53574&stt=001

Gakuru, M., & Ngugi, K. (2005). *Development of a Kiswahili text-to-speech system*. Nairobi, Kenya: University of Nairobi.

Gaved, M. (1993). Pronunciation and text normalization in applied text-to-speech systems. *Proceedings of Eurospeech, 93*(2), 897–900.

Hakulinen, J. (1998). *Suomenkieliset puhesynteesiohjelmistot* (*The software based speech synthesizers for Finnish*). Report Draft, University of Tampere, Department of Computing Science, Speech Interfaces, 26.8.1998.

Hallahan, W. (1996). DECtalk software: Text-to-speech technology and implementation. *Digital Technical Journal, 7*(4), 5–19.

Hon, H., Acero, A., Huang, X., Liu, J., & Plumpe, M. (1998). Automatic generation of synthesis units for trainable text-to-speech systems. In *Proceedings of ICASSP 98* (*CD-ROM*).

Hood, M. (2004). *Creating a voice for festival speech synthesis system*. Honour's thesis, Department of Computer Science, Rhodes University, Grahamstown, South Africa.

Huang, X., Acero, A., Adcock, J., Hon, H., Goldsmith, J., Liu, J., & Plumpe M. (1996). Whistler: A trainable text-to-speech system. In *Proceedings of ICSLP96* (4).

Huang, X., Acero, A., Hon, H., Ju, Y., Liu, J., Mederith, S., & Plumpe, M. (1997). Recent improvements on Microsoft's trainable text-to-speech system—Whistler. In *Proceedings of ICASSP97* (2) (pp. –934).

Juang, B. H., & Rabiner, L. R. (2004). *Automatic speech recognition—A brief history of the technology development*. Atlanta, GA: Georgia Institute of Technology.

Klatt, D. (1987). Review of text-to-speech conversion for English. *Journal of the Acoustical Society of America, 82*(3), 737–793.

Malusi, Y., & Kogeda, O. P. (2013). A mobile transport scheduling and coordination system for marginalized rural areas. In *The Proceedings of 15th Annual Conference on WWW Applications*, September 10–13, 2013, Cape Peninsula University of Technology, Cape Town, South Africa.

Martha, E. J. (2006). The application of information and communication technology (ICT) in Nigerian Academic Libraries prospects and problems. *The Information Manager, 6*(1 & 2), 35–39.

Mashao, D. J., & Rousseau, F. (2005). A hybrid text-to-speech system for Afrikaans. In *Proceedings of SATNAC 2005*, Central Drakensberg, Kwazulu-Natal, South Africa.

Morton, K. (1987). *The British Telecom Research text-to-speech synthesis system—1984-1986. Speech production and synthesis*. Unpublished Ph.D. thesis, University of Essex (pp. –172).

Parssinen, K. (2007). *Multilingual text-to-speech system for mobile devices: Development and applications*. Doctoral thesis, Department of Signal Processing, Faculty of Information Technology, Tampere University of Technology, Finland.

Portele, T., Höfer, F., & Hess, W. (1994). *A mixed inventory structure for German concatenative synthesis*. Bonn, Germany: University of Bonn.

Portele, T., & Krämer, J. (1996). Adapting a TTS system to a reading machine for the blind. In *Proceedings of ICSLP 96 (1)*.

Portele, T., Steffan, B., Preuss, R., & Hess, W. (1991). German text-to-speech synthesis by concatenation of non-parametric units. *Proceedings of Eurospeech, 91*(1), 317–320.

Portele, T., Steffan, B., Preuss, R., Sendlmeier, W., & Hess, W. (1992). HADIFIX—A speech synthesis system for German. *Proceedings of ICSLP, 92*(2), 1227–1230.

Retrieved March 26, 2010, from http://www.cstr.ed.ac.uk/projects/festival/manual/festival_24.html

Rousseau, F., & Mashao, D. (2004). Increased diphone recognition for Afrikaans text-to-speech system. In *Proceedings of PRASA 2004* (pp. –117), Cape Town, South Africa. Retrieved October 23, 2012, from http://www.prasa.org/proceedings/2004/prasa04-21.pdf

Schroeter, J., MZibius, B., van Santen, J., Sproat, R., & Olive, J. (1996). Recent advances in multilingual text to speech synthesis. In *Fortschritte derAkustik- DAGA '96*. DPG, BadHoMef, Germany.

Tadesse, A., & Takara, T. (2006). Amharic speech synthesis system and its applications to multimedia and telecommunications. In *International workshop on Advanced Image Technology*, January 9–10, Naha, Okinawa, Japan (pp. –191).

Vusani, S., & Kogeda, O. P. (2012). An interactive voice forum for rural subsistence farmers in South Africa. In *The Proceedings of 14th Annual Conference on WWW Applications*, 7–9 November 2012, Mangosuthu University of Technology, Durban, South Africa.

Waters, K., & Levergood, T. (1993). *DECface: An automatic lip-synchronization algorithm for synthetic faces*. DEC Technical Report Series, Cambridge Research Laboratory, CRL 93/4.

Weigal, G., & Waldburger, D. (eds.) (2004). *ICT4D— Connecting people for a better world*. Berne and Kuala Lumpur: Swiss agency for Development and Cooperation and Global Knowledge Partnership.

Yvon, F., Boula de Mareuil, P., & Alessandro, C. D. (1998). Objective evaluation of grapheme to phoneme conversion for Text-to-Speech synthesis in French. *Computer Speech and Language, 12*, 393–410.

Chapter 9
Information and Communication Technology Platform Design for Public Administration Reform: Tensions and Synergies in Bangalore, India

Shefali Virkar

1 Introduction

Over the course of the last two decades, globalisation and information technology have been rapidly dismantling traditional barriers to trade, travel and communication, fuelling great promise for progress towards greater global equity and prosperity. Attracted by the 'hype and hope' of Information and Communication Technologies (ICTs), development actors across the world have sought to adopt computer-based systems for use in government as a means of reforming the inefficiencies in public service provision. Much has been written about e-governance within a growing stream of literature on ICT for development, generating countervailing perspectives where optimistic, technocratic approaches are countered by far more sceptical standpoints on technological innovation.

In trying to analyse both their potential and real value, however, there has been a tendency for scholars to see e-governance applications as isolated technical artefacts, analysed solely as a collection of hardware and software. Far less work is based on empirical field research, and models put forward by scholars and practitioners alike often neglect the actual attitudes, choices and behaviour of the wide array of actors involved in the development, implementation and use of new technology in real organisations as well as the way in which these applications shape and are shaped by existing social, organisational and environmental contexts.

In recent years, cross-sectoral collaborations for e-government software development and sustainability have come under increasing scrutiny as governments turn to the private and non-profit sectors in their quest for high-end technology and

S. Virkar (✉)
Department of Politics and International Relations, Keble College, University of Oxford (UK), Parks Road, Oxford OX1 3PG, UK

27 Marlborough Hill, London NW8 0NG, UK
e-mail: shefali.virkar@politics.ox.ac.uk; shefali.virkar@gmail.com

S. Saeed (ed.), *User-Centric Technology Design for Nonprofit and Civic Engagements*, Public Administration and Information Technology 6, DOI 10.1007/978-3-319-05963-1_9,

examples of organisational best practice. For the public sector body, such public-private partnerships (PPPs) offer attractive advantages including increased private finance and investment, greater technological experience and expertise, better risk-sharing, greater public legitimacy resulting from being associated with a successful global corporation, a potential downsizing of the public sector and/or a decrease in publicly subsidised programmes (Fife and Hosman 2007). The public sector at large may also tap into the benefits associated with a liberalisation of regulations and markets (at least in the Telecom and Information Technology sectors), an increased access to new technologies, and exposure to private and tertiary sector work cultures and practices (Virkar 2011).

For the private partner, advantages include access to new markets, greater lobbying power and a say in policy decisions, better risk-sharing, reductions in market uncertainties and an improved image as a result of both their involvement with government and their 'philanthropic', 'citizen-friendly' or 'not-for-profit' work (Virkar 2004). However, governments, individual public sector agencies and private companies are all potentially susceptible to a number of possible negative outcomes including the emergence of severe asymmetries of power and information, and the political and financial risks associated with the failure of key macro-level top-end projects.

This chapter seeks to unravel, through the presentation of a case study, the social dynamics shaping e-government projects used to reform public sector institutions; in particular focusing on the impact that actor behaviour has on project performance within the setting of public sector partnerships with private and not-for-profit organisations. The value of such an approach is based on a review of existing development and political science literature, which tends to be not only overly systems-rational in its approach, but also lacking an in-depth understanding of the underlying actor motivations, values and interests that drive and sustain such cross-sectoral initiatives (Virkar 2011). As a consequence, the literature does not recognise the degree to which cross-sectoral project failure (viz. the general inability of the project design to meet stated goals and resolve both predicted and emerging problems) is symptomatic of a broader, much more complex set of interrelated inequalities, unresolved problems, and lopsided power-relationships both within the adopting organisation and in the surrounding design and environmental context.

2 Research Framework

In the existing literature to date, some research has already been conducted to assess the perceptions and attitudes of strategic élites and non-strategic actors to generally change processes within local government bodies. However, almost all this work has been done from a management studies perspective (without specific reference to those perspectives on e-government project outcome) and is based chiefly on the experiences of actors within developed countries' organisations (Asquith 1998). Little work to date has been done to assess the dynamics of e-government project

design and implementation on the success or failure of those initiatives, particularly in the context of the developing world, and it is this gap that this chapter hopes to fill.

The theoretical framework adopted by this research will emphasise three issues: first, the concept of tax administration and governance which is related to the set of institutions and rules that set the limits on, and the incentives that result in the constitution and working of interdependent networks of actors; second, the electronic government concept itself; and finally, the relationship between technology, organisation and institutional change. To do this, it will seek to ground its case study in three major complementary strands of literature:

1. A conceptual discussion of the role and interactions of a multiplicity of actors with diverse motivations and strategies, conceptualised as an *ecology of games*, within the umbrella of New Institutionalism, and their role in the shaping of political organisations and institutions, with special reference to the success or failure of e-government projects.
2. The literature which deals with public administration reform, and the role of ICTs in improving the functioning of public organisations and in the reduction of corruption within a developing country context.
3. A discussion of the importance of property tax for local government, particularly at the local level, and the definition and scope of property tax reform in India.

Conclusions will be reached through the concurrent use of three dimensions—theoretically on the basis of existing literature, descriptively on the basis of a case study, and analytically using the concept of the Ecology of Games and that of the Design-Actuality Gap model.

3 Research Methodology

The ultimate aim of this chapter is thus to contribute to the development of a conceptual framework that is relevant to policy discussions of e-government within not only an Indian, but also a broader global context. In order to augment theoretical discussions of administrative reform in a digitised world, therefore, the chapter uses a case study to explore its central research issues, within which a mixed methods approach was selected in order to inform and strengthen the understanding of the relationships between the actors, inputs and project outputs.

To achieve this, the research surrounding the case study was developed in the following manner: first, a thorough review was conducted of existing theoretical perspectives and literature surrounding corruption and tax evasion, ICTs and public administration, and property tax reform. Quantitative data relevant to the case was then collected and analysed, and corroborated with a qualitative analysis of official documents. The case study was then further developed through a series of in-depth personal interviews, data analysis and data interpretation; after which conclusions were prepared and validated together with recommendations for the future.

The use of mixed-method case study research is becoming increasingly popular in the social sciences, recognised as a successful approach for investigating contemporary phenomena in a real-life context when the boundaries between phenomenon and context are not evident and where multiple sources of evidence present themselves (Yin 2003). It was thus felt to be a particularly apt way of studying the nature and impact of actor actions and motivations on e-government project outcome, where the aim was not simply to judge whether the project at hand represents a success or failure, but to understand the qualities that have made it so.

Case study research consists of a detailed investigation of phenomena within a given context, often with data being collected over a period of time, the aim of which is to provide an analysis of the surrounding environment and processes to throw light on the theoretical issues being investigated (Eisenhardt 1989). The phenomenon under examination is thus not isolated from its context, rather it is of interest precisely because the aim is to observe and understand actor behaviour and/or organisational processes and their interplay with the surrounding environment. The use of a case study itself is therefore not as much a method as it is a *research strategy*, where the context is deliberately included as part of the overall design. Today, case studies are widely used in organisational research across the social sciences, indicating growing confidence in the approach as a rigorous research strategy in its own right (Hartley 2005).

4 Sources of Evidence and Data Collection

The key activity critical to data collection for this research was the identification of a suitable case study to be analysed, an aim met through the selection of the project, based in the Indian city of Bangalore, discussed previously. In order to appropriately assess the outcome of the project, and the impact that actor motivations had on key decisions taken during the design and implementation process, interviews were carried out with a number of people who had direct responsibility for, or an impact upon, the conception and development of the given case.

Whilst some might argue that diversity of the kind likely to be encountered in a study of local government such as this one is impossible to capture fully (Stanyer 1979), this research project nevertheless has endeavoured to bring together a broad cross-section of different experiences, each giving an insight into different stages of the case study's inception and implementation and adoption. Semi-structured, individual-centred interview techniques were employed to help uncover consistencies (and inconsistencies) in viewpoints and provide an in-depth understanding of actor motivations and actions not easily achieved otherwise. For this study, 40 interviews were conducted over a 24-month period. The interviewees can be roughly divided into four groups based on their relationship to the case:

1. *Senior Civil Servants* involved with the planning and implementation of the project, including current and former Greater Bangalore Municipal Corporation

(BBMP) Commissioners, Deputy Commissioners for Revenue, and Revenue Officers.
2. *Revenue and Tax Officials*, primarily Assistant Revenue Officers (AROs) responsible for the in-the-field collection and administration of property tax in the city.
3. *Software Developers* involved in the conception, design and implementation of the project.
4. *Miscellaneous Actors* including journalists and external consultants.

Once identified, all potential interviewees were contacted by telephone at their place of work or via e-mail. If the interviewee was not easy to reach, a message would be left and a visit would be paid to their place of work. An interview would then be conducted at a mutually convenient time. All subjects asked agreed to express their views and experiences, although some required more persuasion than others and often repeat visits had to be made to the relevant revenue office in order to meet different people. All the interviews were conducted face-to-face, usually at the respondent's place of work (Virkar 2011).

5 Examining ICTs Within the Context of Organisational and Institutional Change

Traditionally, political institutions have been seen as preconditions for civilised society, with students of politics being interested in how they work and how their organisation within a society impacts the lives of citizens (March and Olsen 1989). Institutions may be defined as: '…the structure that humans impose on human interaction and therefore define the incentives that together with the other constraints (budget, technology, etc.) that determine the choices that individuals make that shape the performance of societies and economies over time' (North 1990).

Institutional change, therefore, refers to the intentional or voluntary insertion of innovation into a current system through a sufficiently assumed transformation of its rules and internal games. Alterations of relative prices, such as information costs or technology changes, become the most important sources of institutional change. However, changes in relative prices are motivated both by the transformation of actor perceptions regarding those changes, as well as the behaviour alterations which those perceptions give rise to; that is, by the construction of new mental models that result from the acquisition of learning and skills which help interpret the new context. Institutional change generally occurs whenever an alteration in the relative cost is perceived by one or more group of actors as a out-and-out victory for the group, or a win-win situation for all participants involved.

Organisational change within institutions, on the other hand, may be understood as the deliberate design and implementation of a structural innovation, a policy, a new goal, or an operational transformation; it may be accepted that ICT applications could result in organisational changes (such as the efficient and speedy delivery of public services, increased proximity of services to the citizen, or simplification of

formalities and requirements) that impact public management values (Thomas and Bennis 1972).

In assuming that the manner in which ICT applications are being used depends on the type of institution they are adopted by, it may be accepted that the potential benefits of implementing an e-government strategy will be strongly influenced by current institutions of government as the actors involved determine the choices they make depending on the incentive systems within those structural arrangements (Fountain 2002). ICTs for use in the public sector are therefore designed, developed and used according to the preferences of both government stakeholders and non-governmental private entities which, in turn, have been shaped taking into consideration the formal and informal rules and constraints (or institutions) as well as the enforcement characteristics of both (Fountain 2001).

However, it does not automatically lead on that technology transformations alter the *status quo* of the public organisations. According to Gascó (2003), ICTs will give way to institutional change if the new skills and learning that governmental actors acquire change their perception about the potential gains that result from the new situation. In turn, the degree to which those perceptions may be altered depends on how much the workplace of that actor is affected by the new structures that result from ICTs applications.

6 Understanding Actor Behaviour

The central issue that needs to be understood whilst studying the development of ICT platforms and their implementation in public sector organisations through an analysis of actor interactions is thus: *Why do people do what they do*? One approach to understanding behaviour is to look at the rationality of individual actors, rather than the system as a whole. This is largely because political actors are driven by a combination of organisational and institutional roles and duties and calculated self-interest, with political interaction being organised around the construction and interpretation of meaning as well as the making of choices.

Political actors, in general, have a complex set of goals including power, income, prestige, security, convenience, loyalty (to an idea, an institution or the nation), pride in work well done, and a desire to serve the public interest (as the individual actor conceives it). According to Downs (1964), actors range from being purely self-interested ('climbers' or 'conservers' motivated entirely by goals which benefit themselves and their status quo rather than their organisations or the society at large) to having mixed motives ('zealots', 'advocates' and 'statesmen' motivated by goals which combine self interest and altruistic loyalty with larger values). An in-depth analysis of the ICT for development literature by this researcher identified five actor groups involved in games relating to the implementation of e-government projects:

1. *Politicians*: The first group identified comprises of elected representatives of various hues, guided and influenced chiefly by electoral imperatives and a need

to maintain their public image, and are therefore concerned with directing both key economic policy issues as well as issues of public service delivery.
2. *Administrators/civil servants*: This group of actors is guided by their perceptions of existing institutional 'culture' and practices and their positive (or negative) attitudes towards internal bureaucratic reforms such as concerns about the downsizing of administrative services to promote 'efficiency' and a sense of being policed by elected government through the introduction of ICTs.
3. *Organisations dealing with technical designing of IT systems for tax collection*: The approach private IT suppliers take to e-government might be considerably different to what the adopting government agency actually needs or wants from a system.
4. *Citizens*: This is another particularly interesting group of actors as one is never quite sure what their reaction to the implementation of e-government will be. Whilst in theory citizens should welcome the introduction of a system that simplifies administrative processes, in practice it is equally possible that some citizens might not be very happy if a more efficient system was put into place.
5. *International donors*: This final actor group controls the purse-strings and oftentimes comes to the table with 'higher' ideals coloured by ideas prevalent in international politics (such as the desire to see a particular brand of 'good governance' in the developing world).

The empirical study of the BBMP presented in this chapter has one key limitation, which is that the discussed findings and their implications are obtained from a single case study that examined a particular mode of e-government using an experimental technological platform targeting a specific user group. Thus, although the findings throw light on most of the key factors influencing the behaviour of actors and actor groups involved with the development of e-government platforms, indeed e-governance initiatives, worldwide, care needs to be taken to avoid over-generalising these findings and conclusions whilst examining other technologies, groups or governments. That said, despite this potential threat to the validity of the case at hand, the use of mixed method data triangulation as a research strategy ensures that the study fully captures the key elements of and challenges to and the motives and machinations prevalent behind the development of innovative e-government technologies based on old forms of citizen participation and engagement.

7 e-Government: Definition and Scope

Over the last 10 years, a number of scholars and international organisations have defined e-government in an attempt to capture its true nature and scope. Almost all definitions of e-government indicate three critical transformational areas in which ICTs have an impact (Ndou 2004), illustrating that e-government is not just about the Internet and the use of Internet- and web-based systems with government and citizen interfaces (Heeks 2006); instead it includes office automation, internal management, the management of information and expert systems, and the design, and adoption of such technologies into the workplace (Margetts 2006).

The internal arena: where ICTs are used to enhance the efficiency and effectiveness of internal government functions and processes by intermediating between employees, public managers, departments, and agencies. The use of ICTs is thought to improve internal efficiency by enabling reductions in both the time and cost of information handling, as well as improving the speed and accuracy of task processing. In other words, technology is felt to significantly reduce processing times, eliminate inefficient bureaucratic procedures and skirt manual bottlenecks; allowing information to flow faster and more freely between different public sector entities.

The external arena: where ICTs open up new possibilities for governments to be more transparent to citizens and businesses by providing multiple channels that allow them improved access to a greater range of government information. ICTs also facilitate partnerships and collaborations between different government institutions at different levels of a federal structure and between the government and other non-governmental actors.

The relational sphere: where ICT adoption has the potential to bring about fundamental changes in the relationships between government employees and their managers, citizens and the state, and between nation states; with implications for the democratic process and the structures of government.

Thus, although the term e-government is primarily used to refer to the usage of ICTs to improve administrative efficiency, it arguably produces other effects that would give rise to increased transparency and accountability, reflect on the relationship between government and citizens, and help build new spaces for citizens to participate in their overall development (Gascó 2003). Broadly speaking, e-government may be divided into two distinct areas: (1) *e-Administration*, which refers to the improvement of government processes and to the streamlining of the internal workings of the public sector using ICT-based information systems, and (2) *e-Services*, which refers to the improved delivery of public services to citizens through ICT-based platforms. The adoption of e-government often involves interactions to reform the way governments, their agencies, and individual political actors work, share information, and deliver services to internal and external clients by harnessing the power of digital ICTs—primarily computers and networks—for use in the public sector to deliver information and services to citizens and businesses (Bhatnagar 2003a, b, c, d, e).

8 e-Government Delivery Models

e-Government platforms and applications are generally developed in two stages (Virkar 2011). Initially, a back-office system is set up within the adopting agency, usually in line with software specifications and with software developer input, to handle online processes and information about services provided by the agency is published on a website. The second step involves the setting up of the 'front-office': the use of ICTs in the actual delivery of a service, where citizens can interact with

the site to download application forms and information sheets for a variety of services such as filing a tax return or renewing a licence, with more sophisticated applications being able to process online payments.

Interactions involving the design and development of e-government systems and platforms and the formulation of related technology policy are further supported through the adoption of a key, three-stage strategy used by actors in such games. At the core of this strategy, relevant particularly to those in developing countries who wish to radically transform public administration by moving government services from manual processes to online systems, is the move to develop and adopt different models of service delivery electronically at different stages of the growth and development process and involves a coordinated effort by both the public and private sector partner. The first move generally involves the automation of basic work processes and the online provision of information and services by government departments from computers based within the departmental premises (Bhatnagar 2003a, b, c, d, e).

Citizens interact with a designated government employee or private computer operator who accesses data and processes transactions on their behalf. Locating online terminals within agency premises tends to result in greater ownership of the system by government staff, reducing resistance to technology and facilitating easier acceptance of change (Ravishankar 2013). However, the downside of this mode of delivery is that citizens are still required to visit different government departments to avail different public services, all within their fixed hours of work. In addition, the dependence of an entire agency office on a single person (or small group of people) to operate the system may cause friction.

The second stage in the evolution of service delivery platforms is the use of conveniently located citizen kiosks or service centres in public places, again manned by public or privately hired operators (Basu 2004). This mode of delivery scores over the previous one as multiple services—municipal, state or federal—may be offered at each location. Kiosks also generally stay open longer than government offices, both before and after regular office hours, maximising system coverage by allowing working individuals to access services at times more convenient to them. In recent years, citizen service centres have become popular, particularly in countries where Internet penetration is low.

The final stage in the development of platforms for e-government service delivery, popular in countries where Internet penetration and skills are high, is the emergence of the one-stop shop online portal from where citizens with a computer and an Internet connection that may, at any time of day, access a whole range of public information and services themselves without having to visit a kiosk or depend on a computer operator (West 2004).

However, for such a mode of service delivery to become ubiquitous, a number of conditions need to be in place and met—the back-end of the government agency in question must be fully computerised and an accord struck with the private partner as to how the system will be administered and run, citizens must be equipped with the technological hardware and skills to access the system fully, government staff must be adequately trained on the new technology, security and privacy loopholes must be closed and trust in online transactions must be built up and maintained.

The step-by-step strategy outlined above is generally adopted by key political and administrative actors involved with the implementation of e-government projects, and if followed may reduce political tensions and controversies that might arise as the result of change by not only ensuring maximum citizen access to services, but also an increased acceptance of the technology by agency staff (Bhatnagar 2003a, b, c, d, e).

9 Assessing Project Outcome: The Ecology of Games Metaphor

From the turn of the century to the present, there has been a progressive movement away from the view that governance is the outcome of rational calculation to achieve specific goals by a unitary governmental actor (Dutton 1992), and in that context metaphors based on political games have been extremely useful in developing new ways to think about the policy process and explain certain features of political behaviour.

However, Game Theory and other similar metaphors have had, according to scholars, one major limitation in clarifying policy processes: they focus squarely on a single arena or field of action; be it a school, a county, a legislature, etc. as, by their very nature, policy making and implementation cut across these separate arenas, in both their development and impact (Firestone 1989). One of the few efforts to look at this interaction and interdependence in a more holistic fashion was proposed by Norton Long (1958) in his seminal discussion of *The Local Community as an Ecology of Games*.

The Ecology of Games framework, as first laid out in the late 1950s offers a New Institutionalist perspective on organisational and institutional analysis, and was developed as a way of reconciling existing debates about who governed local communities as he believed they had significant flaws. As with most theories of New Institutionalism, it recognises that political institutions are not simple echoes of social forces; and that routines, rules and forms within organisations and institutions evolve through historically interdependent processes that do not reliably and quickly reach equilibrium (March and Olsen 1989).

Long contended that the structured group activities that coexist in a particular territorial system can be looked at as 'games' (Dutton 1992). Games may be interrelated in several ways: actors ('players') might be simultaneously participating in different games, and some might transfer from one game to another (Long 1958). Plays (i.e. moves or actions) made in one game can affect the play of others. Also, the outcome of one game might affect the rules or play of another (Crozier and Friedberg 1980), and players' moves in one game might be constrained by moves within other games. Individuals may play a number of games, or their major preoccupation for the most part may lie with one central interaction (Long 1958).

A researcher might be able to anticipate a range of strategies open to individuals or organisations if they know what role the actor or group played in the game(s)

most central to them. Conversely, when the actions of players appear irrational to an observer, it is likely that the observer does not know the games or interactions in which the players under study are most centrally involved, and the players' moves in one game might be constrained by their moves within other under-examined or overlooked situations. Within each game or interaction, the following elements help the researcher arrive at an in-depth analysis of the impact that various behaviours have on the outcome of the project under study (Virkar 2011):

1. *Key actors*: the individuals, groups or other entities whose interactions shape the particular game being considered.
2. *Game rules*: the written or unwritten codes of conduct that shape actor moves and choices during a game.
3. *Actor goals and motivations*: the aims that key actors seek to attain and maintain from interacting with other players, both broader long-term achievements as well as more short- to medium-term rewards.
4. *Key strategies*: tactics, ruses, and ploys adopted by key actors during the course of a game to keep the balance of the engagement in their favour.
5. *Key moves*: decisions and other plays made by key actors to arrive at key goals, usually if not always based on their strategy of choice.

The crucial insight in Long's theory, however, was not the idea of games per se which, but his linking of that notion to the metaphor of an ecology (Firestone 1989). Ecology as a concept relates to the interrelationships of species in their environment, allowing for numerous relationships amongst entities, and has been used to understand the relationships among individuals and more complex social systems. Most obviously, co-existence within a common space results in competition for resources and power between different actors, and can result in unique modes of operation as means of achieving one's aims. This in turn may lead to either mutual non-involvement in the same space, or active co-operation between different actors and the development of symbiotic relationships. All this speaks of a singular interdependence between different actors within a given territory. Although there may be other relationships as well, what is significantly missing is a single, rational, coordinating presence.

An *ecology of games* is thus a larger system of action composed of two or more separate but interdependent games; underlining not only the degree to which not all players in any given territory are involved in the same game, but also the fact that different players within that territory are likely to be involved in a variety of interactions (Dutton and Guthrie 1991). For Long, territories (or fields of play) were defined quite literally by being local communities. The notion of an 'ecology' of games underlines not only the degree to which not all players in any given territory are involved in the same game, but also the fact that different players within that territory are likely to be involved in a variety of games (Dutton and Guthrie 1991).

Moved from the community context to the world of e-government platform design, adoption and implementation, territories may be diverse—from the inner circle of the project design team, through to the adopting organisation, the nation and finally the international policy arena—but the idea of each stage being a political

community or a collection of actors whose actions have political implications remains the same and is still very much applicable. The Ecology of Games metaphor thus provides us with a useful way to think about how the various players interact in making and carrying out administration and developing policy.

10 Assessing Project Design and Outcome: The Design-Actuality Gap Model

Like all political interactions, the behaviour of actors related to the design of e-government architecture and to the uptake of public sector projects is circumscribed by the organisations and institutions within which they are played out, and by the range of actors taken from the individuals and groups directly and indirectly involved with the processes of decision-making and governance. The eventual outcome of an e-government project in terms of both appearance and efficacy does not, therefore, depend on a single project entity alone, and instead depends on the interaction between different actors in the process and the nature of the relationships between them. Gaps in project design and implementation can in reality be seen as expressions of differences arising from the interaction between different (often conflicting) actor moves and strategies, determined to a large extent by actor perceptions, and played out within the context of set circumstances.

Heeks (2003) concluded that the major factor determining project outcome was the degree of mismatch between the current realities of a situation (the 'where are we now') and the models, conceptions and assumptions built into a project's design (the 'where the e-government project wants to get us'). From this perspective, e-government success and failure depends largely on the size of this 'design-actuality gap': the larger the gap, the greater the risk of e-government failure, the smaller the gap, the greater the chance of project success. By examining numerous case studies related to ICTs and e-government failure in developing countries, Heeks (2002a, b) identified three dominant categories of reported outcome: *total failure*, *partial failure*, and *success*.

- The first possible outcome is *total failure*, where a project is either never implemented or in which a new system is implemented but is almost immediately abandoned.
- A second possible outcome is the *partial failure* of an initiative, in which major goals are unattained or where there are significant undesirable outcomes. Cases range from straightforward underachievement to more complex 'sustainability failures' of an initiative.
- Finally, one may see the *success* of an initiative, in which most actor groups attain their major goals and do not experience significant undesirable outcomes.

Heeks also identified three so-called 'archetypes of failure', situations when a large design-actuality gap, and consequently project failure, is likely to emerge:

Hard-Soft Gaps (the difference between the actual, rational design of the technology and the actuality of the social context within which it operates), *Public-Private Gaps* (the mismatch that results when technology meant for private organisations is used in the public sector without being adequately adapted to the adopting organisation) and *Country Context Gaps* (the gap that arises when a system designed for one country is transferred unaltered into the reality of another).

10.1 Hard-Soft Gaps

Hard-soft gaps refer to the difference between the actual, rational design of the technology (hard) and the actuality of the social context—people, culture, politics, etc.—within which the system operates (soft). These sorts of gaps are commonly cited in examples of e-government failure in developing countries, where 'soft' human issues that are not initially taken into account whilst designing a project result in undesirable effects after implementation. Hard-soft gaps thus may be seen as the outcome of interactions played out primarily at the level of the project itself, between individuals and agencies involved with the design and acceptance of the technology. Many scholars, such as Stanforth (2006), see technology as just one of a number of heterogeneous socio-technical elements that must be considered and managed during the design and implementation of a successful e-government project, whilst Madon (2004) has discussed different sets of case studies which have revealed that numerous factors that have allowed individuals in developing countries to access ICTs (and which depend on resources, skill-levels, values, beliefs, and motivations, etc.) are often ignored. It may thus be inferred that a lack of training, skills, and change management efforts would all affect rates of failure, as it is these factors that would bridge the gap between the technology itself and the context within which it exits.

10.2 Private-Public Gaps

The next archetype put forward by Heeks (2003) is that of private-public gaps, which refer to the difference between organisations in the private and public sectors, and the mismatch that results when technology meant for private organisations is used in the public sector without being adapted to suit the role and aims of the adopting public organisation. A common problem is again the lack of highly skilled professionals in the public sector, resulting primarily from uncompetitive rates of pay in that sector as compared to the private sector (Ciborra and Navarra 2005). The design of e-government projects is consequently outsourced to the private sector, resulting in a clash of values, objectives, culture, and large design-actuality gaps. Public-private gaps are thus of particular relevance to the discussion which follows in this chapter, as they generally arise out of games played at the

level of the adopting government agency, between the agency and its private sector counterparts, although it is not uncommon to find interactions between public and private individuals on project committees having an impact on the outcome of a project as well.

10.3 Country Context Gaps

The final archetype of failure defined by Heeks (2003) is the country context gap, or the gap that arises when a system designed for one country is transferred into the reality of another. This is particularly true for systems transferred between developed and developing countries, where designs for one may clash with the actualities within the other. Country context gaps are, according to Dada (2006) closely related to hard-soft gaps as they arise from, amongst other things, differences in technological infrastructure, skill sets, education levels and working cultures. Country-context gaps emerge chiefly as a result of games played by national, provincial and international actors operating across borders. For instance, decisions to adopt or promote a certain management style or value system, buy or sell a particular technology from a particular organisation or country, or collaborate with particular government agencies in different parts of the world all stem from games of international trade, aid and diplomacy.

Heeks' model is particularly useful given the large investments made by developing country governments in e-government systems and the large opportunity costs associated with implementation, as it encourages project planners to take a focused, holistic view of problem solving; making them consider concurrently the technology at hand, the current circumstances, the impact of actors' motivations and actions, and possible vested interests. It may be used both as a predictive tool anticipating potential failings and heading them off at the initial stages, as well as being used to diagnose problems during the execution of the project. The framework is thus a means of evaluating outcome and problem-solving strategies at all stages during the development of a project, and not just to examine what went wrong in hindsight. However, when taken alone, it is only able to analyse structural weaknesses in a project's design but doesn't on its own provide an adequate explanation of the decision-making processes that led to such structural deficiencies in the first place.

Similarly, the strength of the Ecology of Games lies in its ability to identify and analyse the interrelationships between the different actors involved in the process of e-government system design and adoption. On its own, the framework provides no insight into the consequences of this behaviour and its impact on project outcome when used in combination therefore, as in this chapter, these two frameworks allow the researcher to not only identify and analyse patterns of behaviour within the case under study, but also link decisions and actions to specific project outcomes.

11 Exploring the Case of the Greater Bangalore City Municipal Corporation

The State of Karnataka is particularly interesting when studying the various games and interactions related to the use of Information Technology for public service reform within Indian government departments, as ongoing processes of change within different government agencies in the state have had the use of ICTs deeply implicated in them, and many government and quasi-government bodies have entered into partnerships with private and non-profit organisations. In recent years, there has been growing pressure placed by citizen groups, international agencies, and the local media on both city corporations and the state government to rationalise existing revenue collection structures and improve the collection of property tax in the field, both within cities and across the State at large (Parthasarathy 2013).

In view of the need to turn property tax into a productive tax instrument, the BBMP teamed up with a series of private and not-for-profit technology firms in partnerships which aimed to improve property tax collections across Bangalore city using computerised revenue records and Geographical Information Systems (GIS)-based property mapping. Against the background of technological innovation in the State, project planners decided to do away with the manual, paper-based system of property tax administration considering it to be increasingly archaic, opaque and inefficient. In particular, members of the core project group felt that property tax collections under the manual system had over the years suffered consistently from poor recordkeeping and bad information management practices, slow processing times, and overcomplicated assessment and payment procedures.

The computerised property tax system was thus borne out of an ever-growing need to reform property tax administration in Bangalore city, increasing tax compliance and reducing frustration created amongst taxpayers by the old system. In particular, key improvements sought to improve both revenues and compliance through the improvement of back-office processes and efficiency, the simplification of tax collection methods and the reduction of money lost as a result of malpractice and the ineffective detection and deterrence of tax evasion. Concurrently planners were also spurred on by the need to enhance their own power, authority, and reputations with their respective spheres of influence and beyond.

The application was put together using an Oracle database on an open-source software platform, with the architects using J2E and Java technology to construct the back-end application servers. Personal Digital Assistant (PDA) devices were integrated into the system so that revenue officers could go out in the field to collect taxes, and then use them to upload data back in real time. It was envisaged that citizens would in time also become users of the system, and would be able to have unrestricted access to their property records (and those of the entire city) online. The system's single-most unique feature was to be its eventual use of Geographic Information Systems (GIS) or online virtual mapping tools, to visually aid the revamping of the addressing system and to improve tax coverage through more comprehensive property identification and stricter monitoring (The Times of India 2006).

Between 2004 and 2007, the external face of the project—the BBMP Revenue Department website—remained rudimentary and formed only a small part of the main BBMP site. As the central focus of the Revenue Department project was to boost the efficiency of property tax administration through the automation of back-office processes, project planners by and large ignored the need to provide citizens with a user-friendly front office gateway and online services. The parts of the site devoted to property tax sought chiefly to provide information to citizens about the various aspects of self-assessment and payment, including a handful of downloadable guidebooks and tax forms. However, the information provided on the website was far from comprehensive, with many crucial government reports or publications—such as copies of the all-important property tax handbook—being unavailable for download. As the website developed, some property tax forms and guidelines were made available online, but citizens could not fill these out electronically, manipulate data online or interact with corporation officials in a virtual space.

It was also decided that the system would be integrated with an innovative project known as BangaloreOne, a series of public service counters set up by the Government of Karnataka across the city which aimed to make available round-the-clock multiple services to the public under one roof (Sarangamath 2007). The project was finally realised in August 2009 and the computerised system of property tax administration became the only means of assessing and collecting tax in the city following the complete dismantling of the manual system later that year[1]. The promise made to the people of Bangalore was that the property details of every citizen would be stored in digital databases, and every citizen who paid tax or applied for property tax-related documents would receive a computer-generated receipt and printed-out certificates.

12 Investigating User Perceptions and Attitudes Towards Digitisation and Process Reengineering

As discussed in previous sections, past investigations of e-government have generally been limited in their consideration of the human element during project design and implementation, and tend to overlook the way in which different actors relate to one another and influence outcomes via political processes such as cooperation, alliance building and conflict. It was felt important, therefore, to develop a complete picture of the attitudes and opinions of those individuals directly involved with the chosen case study as end-users, designers or facilitators. This research project makes use of data obtained from 40 in-depth interviews and informal conversations, with project planners and BBMP officials of different ranks based in different revenue offices across Bangalore city. The results of these interviews, summarised and presented below, serve to throw light on the games and interactions that influenced the development of the computerised property tax administration system in Bangalore city.

[1] Personal Interview with PP1, August 2006.

Interviews with tax officials revealed that most individuals involved felt that there had been serious problems with the manual system of tax administration. Officials were of the opinion that the biggest hurdles to the efficient administration of tax that they had encountered prior to the introduction of the computerised database were the poor and haphazard recordkeeping and the large amounts of paperwork that needed to be done manually. Information was scattered across the revenue office network, resulting in an extremely unsystematic workflow as far as the calculation of tax due, the administering collections, and the checking up on and apprehending of defaulters was concerned. Whilst, as expected, none of the revenue officials interviewed mentioned government employee corruption as being a serious problem, many interviewees spoke of the difficulties they faced in identifying and catching tax evaders.

A large percentage of officials interviewed felt that the introduction of technology had greatly impacted old work processes and had helped alleviate the difficulties they faced under the manual system. In particular, they were convinced that the centralisation of property tax data, the ease with which citizens could access their tax information, and the establishment of tax collection points across the city had helped in bringing more properties into the tax net and contributed significantly towards improving tax payer compliance. All the officials interviewed felt that their interactions with the public had significantly decreased since the introduction of the computerised system, and a little over half of them believed their overall relationship with citizens had improved as a result.

Only a small percentage of revenue officials reported that they had been consulted during the design stage of the project. Further, there appeared to be no mechanism in place to solicit user feedback once the initial system had been developed. Almost all the officials interviewed said they felt disconnected from the system. Most professed a high degree of unfamiliarity with the system, and were completely unaware of its key features. For instance, only one tax official mentioned the introduction of GIS mapping techniques as being useful to his work and that of his staff, a worrying fact given that the core project team had placed much store by the GIS maps as a tool to track property tax payments and identify defaulters. These are not good signs, as effective system implementation requires employees to fully accept and adopt the technology in the belief that it will do them some well-defined good.

Further, none of the officials interviewed knew how to operate even its most basic features. With no scheme in place to give them any formal training on the system, all the interviewees reported to be completely dependent on a private computer operator to feed in, change and retrieve electronic property tax data. This, this researcher feels, created a new problem within revenue offices and limited the effectiveness of the system, as it resulted in a shift in the balance of power within the workplace to the disadvantage of revenue officials and consequently hardened their attitude towards computerisation. Senior officers, once enthusiastic about the system, spoke about the frustration they felt at being unable to fulfil their supervisory role and at being put at the mercy of a junior employee. Junior tax officials, already slightly sceptical of the system, feared that their skill levels would put them at a disadvantage within the office and could eventually result in redundancy.

Opinions were divided about whether or not computerisation of the system that had led to improved tax yields. Most tax officials felt that while the introduction of the computerised system had positively impacted tax collections to some extent, there were many other reasons as to why tax yields had improved. For others, the introduction of the Self Assessment Scheme as a means of shifting the responsibility of tax payments onto the shoulders of the citizens and reducing the workload of revenue staff was almost as (if not more) important as the introduction of technology into the workplace. It may be concluded from the interviews that general citizen apathy towards property tax is to a large extent a consequence of poor public awareness about the benefits of paying property tax, a lack of enforcement measures and a general dislike of cumbersome processes—problems which cannot be solved through the introduction of technology alone.

13 The Interviews: key Results

Building on the history of the Property Tax Information System and the discussion of its key actors, this section analyses the results of interviews conducted with 40 tax officials and the core project planning team in an attempt not only to identify the main games that were played out during the design, implementation and adoption of the system but also to construct a platform from which their impact on the outcome of the project at hand may be examined.

14 The Manual System of Property Tax Assessment and Collection

The first step towards identifying the various interactions involved in the design and implementation of the project was to examine the attitudes of both project planners and revenue staff towards the paper-based manual system of property tax administration. It was felt that attitudes and perceptions towards a manual way of working would both indicate the motivations of project planners that led to their decisions and actions, and influence the way in which revenue staff received and acted on the proposed changes. The motivations and perceptions of key institutional actors regarding the manual system of property taxation are summed up in Table 9.1.

15 Managing the Design and Implementation of a Project Using New Technology

Designing a successful e-government project requires that the system be relevant, efficient, effective and above all sustainable. Project management must thus facilitate interactions between actors that engender either cooperation or constructive

Table 9.1 Motivations and perceptions of key institutional actors regarding the manual system of property tax

Institutional actor	Key motivations and perceptions
Senior BBMP officials	• Identified two major problems present in the manual system: poor recordkeeping and haphazard administration • Need to computerise tax records to reduce tax evasion and petty corruption
Senior revenue officials	• Recognised serious problems with the manual system of tax administration • Need for computerised database to cut down on time/ resource wastage
Junior revenue staff	• Felt that manual system of tax administration was extremely slow and time-consuming • Need for computerised records to increase efficiency and reduce workloads

Table 9.2 Motivations and perceptions of key institutional actors regarding the design and implementation phase of the project

Institutional actor	Key motivations and perceptions
Senior BBMP officials	• Need to constitute a core project group to design and manage project • Need to consult senior and mid-ranking revenue officials before initial design stage
Senior revenue officials	• If consulted, felt that their contribution had made a difference • If not consulted, not unduly worried or upset
Junior revenue officials	• Not upset about having no part to play in the consultation process

opposition, not conflict. It was thus thought important to explore the style of management and decision-making of actors involved during the design and implementation phase of the project in interviews as an introduction to the project itself, the results of which are summarised in Table 9.2.

16 Switching to the Computerised System: Impact on Office Processes

A key component of the computerised revenue system was to be the re-engineering of office processes within the department to speed up integration of the new technologies in the office environment. Accounts of the use of technology gained from senior BBMP officials and software providers indicated that the computerised system merely automated existing processes within the Revenue Department, and did not in any way alter old ways of functioning or encourage the use of innovative methods of working. As noted in Table 9.3, only a small number of officials believed that the introduction of technology had not greatly impacted old work processes.

Table 9.3 Motivations and perceptions of key institutional actors regarding the impact of the system on office processes

Institutional actor	Key motivations and perceptions
Senior BBMP officials	• Wanted the system to be designed as a mere replication of current office processes • Were at odds with eGovernments Foundation members on the project planning team, who wished to design a system with greater functionality
Senior revenue officials	• Majority of the opinion that the system did not result in a radical change of office processes • Willing to accept a system that did not result in a heavier workload/new skills • Small number believed the introduction of the Self Assessment Scheme was more significant than the computerised system
Junior revenue staff	• Recognised the system as a simple automation of work processes • Noted that computerisation had not done away completely with manual work

17 Features of the System Preferred by Users

Central to this angle of enquiry is the identification of features of the system that users were happy with, and which they felt had aided them in their work. As seen in Table 9.4, interviews with those behind the design and implementation of the project revealed that the top management of the BBMP expected that the replacement of paper records with a computerised database, online records, and GIS mapping techniques to aid in the tracking of payments and identification of defaulters would greatly help tax officials do their work and would thus be universally welcomed and accepted.

18 Examining User Attitudes to Computerisation

Interviews with senior members of the BBMP and software providers indicated that project planners stood firm in their belief that revenue officials in the field had responded positively to the introduction of the system. In order that this study might gauge initial user attitudes and reactions to computerisation, interviewees were asked to recall in detail their first impressions and opinions of the system, and whether these had changed over time as a result of continued exposure to the new technology. The results of this section are summarised above in Table 9.5.

19 Enumerating the Benefits of Computerisation

Interviews with senior BBMP officials suggested that the introduction of a computerised database and the use of technology in the collection and administration of tax had done away with human error and reduced the scope for misuse of the tax system

Table 9.4 Motivations and perceptions of key institutional actors towards key system components

Institutional actor	Key motivations and perceptions
Senior BBMP officials	• Placed great emphasis on the GIS component as the system's most important feature
Senior revenue officials	• Little or no knowledge of the GIS component of the project • Little or no knowledge of how to operate the system in general
Junior revenue staff	• No basic knowledge of the system • Apparent unawareness of even basic features of the system

Table 9.5 Motivations and perceptions of key institutional actors focusing on attitudes to computerisation

Institutional actor	Key motivations and perceptions
Senior BBMP officials	• Firm belief that revenue officials would respond positively to the implementation of the system • Convinced that changes would be accepted without question, thereby shoring up their own power and authority as senior BBMP figures
Senior revenue officials	• Most reported being delighted with the new system; some initial closet sceptics who were won over with time
Junior revenue staff	• Openly suspicious of the new system from the outset, primarily from fear of being replaced and/or made redundant

Table 9.6 Motivations and perceptions of key institutional actors regarding the benefits resulting from digitisation

Institutional actor	Key motivations and perceptions
Senior BBMP officials	• Belief that problems of the manual system had been completely done away with and that changes to the way of working in revenue offices had been accepted without question • Need to reiterate seniority and authority in the BBMP pecking order
Senior revenue officials	• Recognition that computerisation resulted in a reduction in administrative costs • Belief that in the long-run the system would bring about the increased ability to act autonomously, especially reducing dependence on junior staff and making it easier to keep an eye on them
Junior revenue staff	• Recognition of a reduction of burden/work load • Not (openly) unduly worried about being subject to greater scrutiny by senior officers • Acknowledgement of the role played by BangaloreOne centres and the introduction of the Self Assessment Scheme

for personal gain. Further, according to these officials, the Revenue Department on the whole was happy with the changes brought about by the use of technology in the system and revenue staff felt that the problems they faced under the old system had been solved. Interviewees were thus asked questions regarding what they perceived to be the biggest benefits of the system and name those that they felt had had a positive impact on their work (see Table 9.6).

20 Exploring Changes to Skills and Staff Numbers

In order to gauge the impact that the introduction of the system had had on the human resources of the BBMP revenue department, revenue staff interviewed for this thesis were asked about the number of employees working at the Department before and after the introduction of the system, and also the types of skills that they had had to learn as a result. In addition, junior officials were asked about their own experiences of the system within the context of their skill levels. Their key motivations and perceptions are summarised in Table 9.7.

21 Determining and Solving the Unforeseen Problems of Computerisation

A major complaint amongst those interviewed was that, despite being provided with computers to aid them in their work, they lacked the basic facilities and infrastructure necessary for those computers to function. In particular, officials complained about poor office environments and frequent electricity outages. These and other problems related to the adoption of a computerised system are outlined in Table 9.8.

Table 9.7 Motivations and perceptions of key institutional actors to changes to staff numbers and skills required

Institutional actor	Key motivations and perceptions
Senior BBMP officials	• The appointment of private computer operators to bridge the skills gap in Revenue Offices seen as a key issue, no other major changes to staffing • Perception that appointments would be accepted without question by revenue staff, who would also see the logic in their being made
Senior revenue officials	• Deeply worried about not having the requisite skills to operate the system themselves • Worried that the appointment of computer operators would further erode their authority within the revenue office set-up
Junior revenue staff	• Openly critical of being completely dependent on external (private) employees • Worried about the weakening of their own positions and spheres of influence within the revenue office

Table 9.8 Motivations and perceptions of key institutional actors in confronting unforeseen problems

Institutional actor	Key motivations and perceptions
Senior BBMP officials	• Refusal to acknowledge that the system suffered from any unforeseen/unplanned problems, possibly as a public relations ploy
Senior revenue officials	• Large majority pointed out that basic infrastructural issues contributed to the under-utilisation of the system
Junior revenue staff	• Employment of private computer operators still the biggest 'unforeseen' problem for junior staff

22 Exploring the Impact of Technology on Citizen-Government Relations

It was felt that an important part of the study would be to determine officials' perceptions of their relationship with the citizens they served, both before and after the implementation of the system. Interviewees were therefore asked questions relating to their impressions of their interactions with citizens, and whether they felt that these interactions had improved in quality following the implementation of new ways of government agency functioning. The results are summarised in Table 9.9.

23 Examining the Impact of Computerisation on Tax Yields

Interviewees were almost unanimous in the view that property tax revenue yields had been increasing steadily since the introduction of the Self Assessment Scheme in 2000. Their responses to questions related to the impact of the new system on property tax yields are summed up in Table 9.10.

Table 9.9 Motivations and perceptions of key institutional actors regarding the impact of technology on government-citizen relations

Institutional actor	Key motivations and perceptions
Senior BBMP officials	• Belief that successful implementation of the system would improve the BBMP image in the eyes of the public • Done to bolster official reputations as pro-active members of the government
Senior revenue officials	• Noted significant decrease in interactions with the public • Belief that overall interactions were positive as a result of computerisation
Junior revenue staff	• Noted a significant decrease in workload and interactions • Belief that positive interactions have been done away with, left with negative face-to-face tasks, although even these had become more positive in tone

Table 9.10 Motivations and perceptions of key institutional actors regarding the impact of the system on tax yields

Institutional actor	Key motivations and perceptions
Senior BBMP officials	• Increased tax yields through digitisation set as one of the primary project goals • Firm belief that this had been achieved
Senior revenue officials	• Recognition that tax yields had increased in the years following computerisation • Mixed response as to whether computerisation was in fact responsible
Junior revenue staff	• Recognition that tax yields had increased • Feeling amongst some officials that computerisation had little or no impact on the collection levels

24 ICT Platform Design: Key Actors, Moves, and Games

Interviews with key people involved with the design and implementation of the project, conducted between 2005 and 2009, brought to light a number of games or interactions operating at different levels or 'arenas', all of which had an impact—direct or indirect—on the effectiveness of the system, the nature and feel of the software platform, and its eventual performance and sustainability. These are outlined below:

24.1 Project Planning Committee Games

1. The eGovernment Movement
2. System Conception and Design
   (a) Formation of the Core Project Planning Group
   (b) Initial Design and Conception of the System
3. The Digital Democracy Game (Table 9.11)

Table 9.11 Project planning committee games

Games	Key players	Key objectives	Nature of moves
e-Government movement	Various current senior BBMP officials, software providers	Encourage BBMP departmental reform through the use of technology	Positive game play
System conception and design			
(c) Formation of the Core Project Planning Group	Various current senior BBMP officials, software providers	Take credit for the initial design idea and design process	Negative game play
(d) Initial design and conception of the system	BBMP officials on the project planning committee, eGovernments Foundation representatives	Design and launch a successful system	Altruistic game play
Digital democracy	Senior BBMP officials and eGovernments Foundation members	Seek to influence the design of the PTIS to support their conception of democracy	Negative game play

Source: Author Analysis (2010)

Table 9.12 BBMP revenue department games

Games	Key players	Key objectives	Nature of moves
System acceptance games	Project planning group (Senior BBMP officials, software providers, external consultants), senior and junior revenue officials	Get officials on the ground to accept and adopt the system	Positive game play
Efficiency games	Senior BBMP officials, Assistant Revenue Officers, and junior revenue staff	Hold down costs and increase tax revenues by improving efficiency	Positive game play
Management control	Senior BBMP officials, Revenue officials	Expand power and decisional control	Negative game play
Game to control petty corruption	Senior BBMP officials, Revenue officials	Reduce revenue losses from petty corruption	Negative game play
Revenue office politics	Revenue Officials, Assistant Revenue Officers, Station Managers, junior revenue staff	Assert 'superior' status, retain power and authority within the field office	Negative game play

Source: Author Analysis (2010)

24.2 BBMP Revenue Department Games

1. Games for System Acceptance
2. Efficiency Games
3. Management Control
4. Games to Control Petty Corruption
5. Revenue Office Politics (Table 9.12)

24.3 Bangalore City Games

1. Image-Building Games
2. The Tax Compliance Game (Table 9.13)

24.4 National-Level Games

1. The Innovation Game
2. Game for Business Competition (Table 9.14)

Table 9.13 Bangalore city games

Games	Key players	Key objectives	Nature of moves
Image-building game	BBMP officials, the media, citizens	Improve image of the BBMP as an accountable, modern and responsive government agency	Positive game play
Tax compliance game	BBMP officials, the media, citizens	Encourage citizens to pay taxes through a mixture of carrot and stick initiatives	Largely positive game play

Source: Author Analysis (2010)

Table 9.14 National-level games

Games	Key players	Key objectives	Nature of moves
Image-building game	BBMP officials, the media, citizens	Improve image of the BBMP as an accountable, modern and responsive government agency	Positive game play
Tax compliance game	BBMP officials, the media, citizens	Encourage citizens to pay taxes through a mixture of carrot and stick initiatives	Largely positive game play

Source: Author Analysis (2010)

In order to determine the ways in which the games played out during the reform of BBMP property tax administration system have had a significant impact on property tax yields and tax compliance policy, and the subsequent sustainability of the system itself, this chapter analyses property tax data for Bangalore city and selected wards for the tax years 1998/99 to 2007/08 obtained by this researcher from official sources. Data analysed includes the total annual revenue accrued from property tax in Bangalore city for the years under study (including expected revenue, actual revenue, and the shortfall if any), the total number of properties assessed annually for the period between 2001/02 and 2007/08, and the annual average revenue per property from 2001/02 to 2007/08; all of which have been correlated with qualitative interview data to develop a holistic understanding of the actor behaviour and subsequent project outcomes outlined above.

25 Examining Property Tax Revenue Collections and Compliance Data for Bangalore City

The performance of the revenue system was assessed against two axes, the first being defined in terms of absolute revenue collected over the 10-year period, based on figures given to this researcher by the BBMP. Property tax revenue targets were plotted for the city and for each ward, and compared to actual revenue collections over the period under study. Whilst no satisfactory definition was forthcoming from official sources regarding the precise nature of the computation, it was presumably

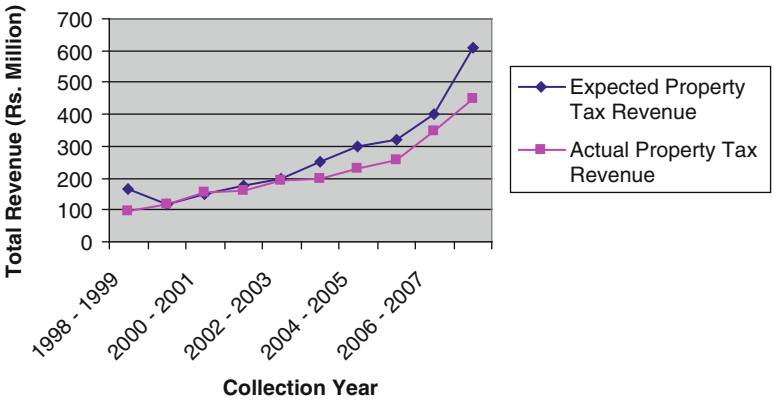


Fig. 9.1 Property tax revenue for Bangalore city (1998/99 to 2007/08) (*Source*: Author analysis, Bruhat Bengaluru Mahanagara Palike, 2009)

based on the current year's expected revenue from existing properties corrected for depreciation, plus projected revenue from new residential and commercial properties in the coming year. The second performance indicator was collection efficiency. Expressed as a percentage, the collection efficiency figure is calculated using the difference between projected and actual revenue figures, and indicates not only the percentage of projected revenue collected by the tax levying authority but also the level of tax compliance in the ward for the tax year under study.

The graphs in this section seek to analyse property tax revenues for Bangalore city as a whole. As mentioned in the previous section, prior to delimitation in 2009, the BBMP administered 100 wards (not including the outlying areas) which—according to the 2001 census—spanned an area of 211.71 km^2, with a population of 4,301,326 inhabitants (BBMP 2009). Figure 9.1 illustrates the total property tax revenue (expected and actual) collected for Bangalore city from 1998 to 2008. It may be seen that while both expected and actual revenue figures are rising, there is generally a shortfall between the amount of revenue expected by the tax authority and the amount actually collected.

Figure 9.2 shows the change in the number of properties brought under the tax net in Bangalore city between 1998–99 and 2007–08. Overall, the number of properties assessed for tax in Bangalore city rose from 380,956 in 1998/99 to 668,535 in 2007/08 (an increase of 75 %). A more detailed look at the figures reveals that between 1998/99 and 2000/01, prior to the introduction of the Self Assessment Scheme, the rise in the number of properties assessed was slow, increasing from 380,956 to 404,500 (a percentage increase of 6.1 %). In the years following the implementation of the SAS, from 2000/01 to 2007/08, it may be seen that there was a steady, sharper rise in the number of properties brought under the tax net: from 404,500 in 2000/01 to 547,354 in 2004/05 (an increase of 35.3 %) and then to 668,353 in 2007/08 (an increase of 22.1 %), with an overall increase of 264,036 properties assessed between 2000/01 and 2007/08.

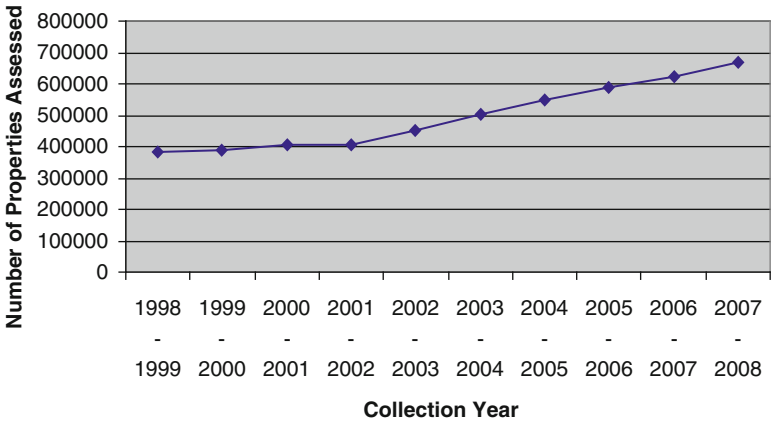


Fig. 9.2 Number of properties assessed in Bangalore city (1998/99 to 2007/08) (*Source*: Author analysis, Bruhat Bengaluru Mahanagara Palike, 2009)

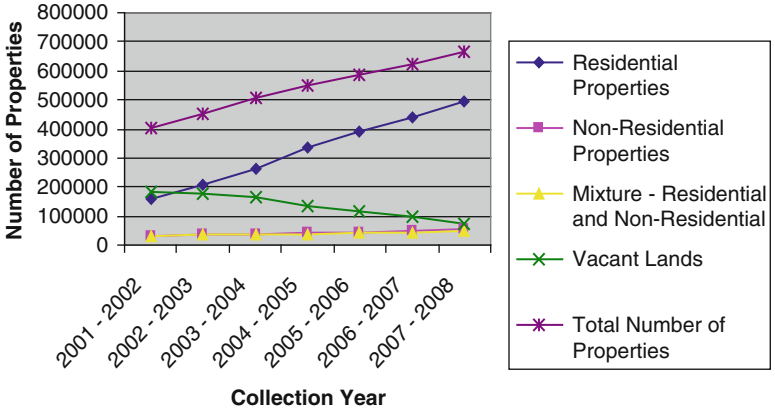


Fig. 9.3 Change in the number of properties assessed (2001/02 to 2007/08) (*Source*: Author analysis, Bruhat Bengaluru Mahanagara Palike, 2009)

Figure 9.3 shows the change in the number of properties assessed according to the nature of their use for the period 2001/02 to 2007/08. For the given period, it may be seen that overall there was an increase in the total number of properties assessed for tax purposes from 405,864 properties in 2001/02 to 668,535 properties in 2007/08—an increase of 64.7 %. A more detailed analysis reveals that the number of residential properties rose from 155,930 properties in 2001/02 to 494,658 properties in 2007/08: an increase of 217.2%!

At the same time, the number of properties used for non-residential purposes also rose, from 31,268 properties in 2001/02 to 54,950 properties in 2007/08 (a more modest, yet significant increase of 75.7%). The number of properties classed

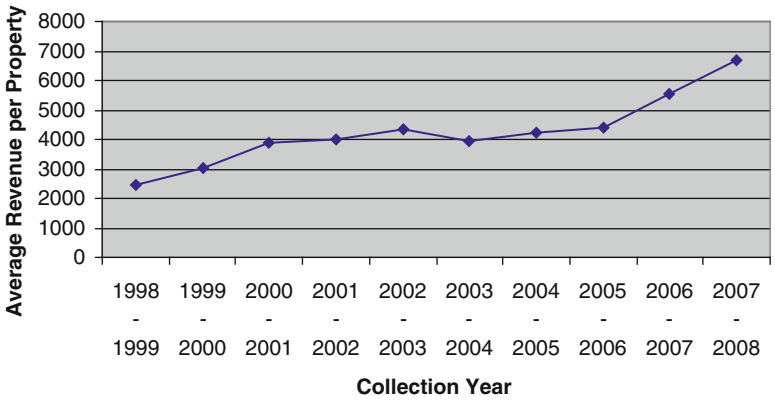


Fig. 9.4 Average revenue per property for Bangalore city (1998/99 to 2007/08) (*Source*: Author analysis, Bruhat Bengaluru Mahanagara Palike, 2009)

as 'mixed use properties' (used for both residential and non-residential purposes) increased by 41.3%: from 33,410 properties in 2001/02 to 47,233 properties in 2007/08. Simultaneous with these increases, the city saw a significant decrease in the number of vacant lands assessed, with that number dropping from 185,256 in 2001/02 to 71,694 in 2007/08, a fall of 61.3%.

Figure 9.4 illustrates the change in average revenue per property accrued to the BBMP Revenue Department from the period 1998/99 to 2007/08. For the given period, average revenue per property increased from Rs. 2,474.56 (~$50) in 1998/99 to Rs. 6,712.13 (~$135) in 2007/08; an increase of 171.24%. However, a closer look at the data reveals that there has not been a steady increase in average revenue per property for the period under study. For instance during the period 2000/01 to 2007/08 average revenue per property fluctuated, despite there being a steady rise in the number of properties assessed during the same duration. Average revenue rose from Rs. 3,893.69 (~$78) in 2000/01 to Rs. 4,326.19 (~$86) in 2002/03 before falling to Rs. 3,961.40 (~$79) the following year, after which it increased steadily from 2004/05 onward.

These findings may be further corroborated by looking at tax compliance data for Bangalore city as a whole, set out in Table 9.15. For the city overall, the data shows that whilst the number of properties brought under the tax net increased relatively steadily between 1998/99 and 2007/08, actual revenue collected by the BBMP did not increase at the rate expected—rising dramatically during the years following the introduction of the Self Assessment Scheme, then gradually falling behind the expected revenue.

Whilst the increase in the number of properties may to a large extent, be attributed to improvements in recordkeeping and information management practices stemming from the use of digital databases at the BBMP, the introduction of computers carried out between the years 2004 and 2005 does not seem to have made a significant impact on BBMP revenue collections for the city as a whole. One may

Table 9.15 Levels of tax compliance for Bangalore city between 1998 and 2008

Year	Compliance level (%)
1998–1999	57.73164309
1999–2000	97.91666667
2000–2001	105
2001–2002	92.85714286
2002–2003	97.5
2003–2004	80
2004–2005	77.31666667
2005–2006	80.65625
2006–2007	86.8125
2007–2008	73.56229508

Source: Author Analysis (2009)

conjecture, therefore, that the SAS allowed for the undervaluation of declared tax per property, possibly in collusion with tax assessors, and that such a fluctuation in revenue is indicative of poor compliance as a steadily increasing number of properties brought under the tax net should otherwise logically result in a steady increase in revenues for the government.

26 What's in a Game? Discussing e-Government Success and Failure

This chapter sought to unravel the social dynamics shaping e-government projects used to reform public sector institutions with special reference to local government in India. The main goal of this research was thus to approach the issues thrown up by the organisational and institutional transformations that occur in public administration and in attempting to answer these questions, this chapter focused on the empirical case study dealing with the design, implementation and subsequent use of an electronic property tax system based in the Revenue Department of the BBMP.

The overarching aim of the computerised system was to improve tax revenues and tax compliance through the streamlining of tax administration processes by increasing back-office efficiency, simplifying methods of tax payment, reducing the amount of money lost through petty corruption and improving tax yields and citizen compliance through the speedy detection of tax evasion. Designers of the project sought to use automation and digitisation to improve data management in the revenue offices, reduce the use of discretion by government officials in revenue-related decisions and make property tax collection processes more transparent. In particular, the system sought to increase revenues from property tax through better quality data, quicker evaluations, greater computational accuracy and positive psychological reinforcement; whilst at the same time reducing losses in revenue occurred as a result of back-office inefficiencies and fraudulent practices through the use of digital databases and GIS maps.

The eGovernments Property Tax Information System is unique in that, not only has it been for a long time one of the few e-government applications rolled out in India to reform the municipal government revenue processes, but also it is a striking example of a working partnership between federal and state government agencies, municipal government bodies and a private not-for-profit software firm. As the analysis in previous sections has shown, certain key games with local impacts get played out in different arenas between actors influenced by not only local but also national and international factors. An examination of interview data and other documents brought to light a number of games in different arenas, each involving key actors related to the project, whose interplay had a bearing on the project's eventual outcome. No single game can account for the ultimate outcome of the Revenue Department project at the time of writing, and instead the impact that the system has had on property tax administration can be best understood as an 'interacting set' or 'ecology' of games—as discussed in previous sections.

Interactions that shaped the design, development and adoption of the system appear to have been layered or 'nested', with minor games often contained within other bigger arenas (Virkar 2011). Key games found to have significantly shaped the design and outcome of the system that appear to have been played out between the different public and private partners during the initial stages of the process, either during the time of its conception (in the form of positive and negative interactions between members of the project planning committee) or at the stage of internal implementation and adoption (in the form of friction between the core project team and the intended end-users such as the field officers), thus corroborating the findings of the quantitative data analysis set out in the previous section of this chapter.

The only city-level game to make any significant impact on the project appeared to be the Tax Compliance game, stemming from interactions between revenue officials at the BBMP and the taxpayers of Bangalore, with even these moves being influenced by input from the private sector partner as the system was further honed and expanded upon. Ideological games and interactions, centred around the interplay of market forces, were also found to have a profound impact on the performance of the tax administration system and its eventual fate, particularly so as a result of prevalence of differing work cultures and organisational values amongst different members of the core project planning and software development team (Virkar 2011).

The discussion of the case study in previous sections also reveals that at the heart of each game lay a design-actuality gap, usually brought about from a power struggle stemming from a deep-seated mistrust between different actor groups. In particular, the case study demonstrates that gaps arise because those with the power and authority to take design or implementation decisions at different key stages of the process are usually unwilling to allow any initiative to go ahead that would give the other actor group(s) in the game more autonomy over the system or more control over their actions. Design-actuality gaps also arise when key actors refuse to acknowledge the impact that external factors and circumstances usually tangential to the project itself have on the construction of public digital architecture and on the shaping of decisions and government policy.

In recognising that design-actuality gaps open up and give way to unfavourable project outcomes if designers and top managers assume that localised outcomes result only from direct local influences, discounting the impact of other factors external to the project at hand, preliminary findings suggest that the project may at the time of writing be classed as a *partial failure* under Heeks' threefold categorisation. However, as evidenced by the discussion, this so-called 'failure' was neither a straightforward case of the outright inability of project managers to achieve stated objectives nor was it a so-called 'sustainability failure' given that the project continues to be in existence today and is still being used to administer tax. Causes of failure to meet stated aims manifested themselves primarily through the existence of both Hard-Soft gaps, stemming from competitive and divisive moves made by actors in key games relating to the system's design and implementation that generated conflict and disharmony in later attempts by users to adopt the system, and Private-Public gaps, rooted in fierce competition and oftentimes rivalry between key executive members on both sides of the Profit-Non Profit sectoral divide that stemmed from their differing values, work cultures and agendas.

27 Conclusion

In modern times, people and their governments have struggled to find easy, cheap and effective ways to run countries. ICT-based applications have the potential to revolutionise patterns of communication between authority and citizenry, radically restructuring politics and governance at all levels by making systems more integrated, transparent and efficient. However, the broader debate surrounding the prioritisation of issues in the setting of a policy agenda still rages in scholarly and political circles. Critics of e-government, and particularly of its introduction into a developing country context, contend that administrative reform is not an important enough issue to justify exposing cash-strapped governments to the risks and opportunity costs associated with ICT projects.

Added to this, there is a tendency for power élites to lose touch with ground realities when devising projects for their organisations as well as for their citizens, especially when planners comprise the higher echelons of government and operate within a top-down command-and-control system of management which runs contrary to their non-profit partners. There is also a danger that high-level project planners will, in looking at macro-outcomes, ignore outliers and how these may precipitate unexpected turns of events. This holds particularly true when existing patterns of communication and information exchange fail to be flexible or unable to adapt to changing situations.

PPPs are generally undertaken in an attempt to bring the benefits of technological efficiencies to a given context, taking advantage of the strengths and interests of each partner in their respective sectors and to combine the resources of government

with those of private agents (businesses or not-for-profit bodies) in order to deliver on societal and welfare goals. These sorts of collaborations give rise to a series of ideological and managerial choices, usually resulting from a difference in work cultures, agendas and institutional practices in the differing sectors. The recent upsurge in PPPs between developing country governments and private non-governmental firms has added a new dimension to the debate surrounding the value and cost-effectiveness of e-government software platforms in the ICT literature, as these collaborative projects require the involvement of individual actors, groups and firms driven by and responding to differing, sometimes conflicting, value systems and behaviour patterns.

As illustrated by the case study, widely divergent underlying motivations for the individual partners and actors identified within and across collaborating organisations can be at once greatly beneficial to government and society at large, resulting in surges of creativity and productivity in software development, and highly disruptive, giving rise to highly divisive and negative interactions and outcomes. Questions still remain unanswered as to whether these divergent motivations and interests may be aligned to ensure win-win situations for all actors concerned and to promote the long-term sustainability of such projects.

Introducing e-government initiatives into public bodies is always a tricky game to play, as computerisation alters the work-load, work profile and content of both the average public sector employee and the run-of-the-mill software engineer—impacting accountability, reducing the opportunities for exercising discretion, making performance more visible, and flattening hierarchies—often forcing both to retrain and retool and sometimes even becoming redundant. Many projects tend to face internal resistance from staff and create resentment against the private sector partner, particularly from the middle to lower levels of the civil service, as moves made to reengineer processes and effect back-end computerisation begin to have a profound effect on the way civil servants perform their duties and perceive their jobs. Very often in developing countries, it is the fear of the unknown that drives this resistance, especially if the introduction of new technology results in a change of procedures and the need for new skills. Further, in corrupt service delivery departments, there may be pressure to slow down or delay the introduction of technology-led reforms due to the impending loss of additional income.

Rapidly evolving economic and social contexts mean that political institutions and the people who constitute them cannot afford to get bogged down in traditional work practices or be impervious or resistant to change themselves. In conclusion, whilst this does not necessarily mean a wholesale rejection of what has gone before, it does mean that there needs to be a constant assessment and reassessment of workplace values and current work practices, eliminating those which result in behaviours that are detrimental to the functioning of the organisation and encouraging those that promote positive interactions within project collaborations and foster cross-sectoral collaboration and understanding.

References

Asquith, A. (1998). Non-elite employees' perceptions of organizational change in English local government. *The International Journal of Public Sector Management, 11*(4), 262–280.

Basu, S. (2004). E-government and developing countries: An overview. *International Review of Law, Computers and Technology, 18*(1), 109–132.

Bhatnagar, S. (2003a). e-Government: Building a SMART administration for India's states. In S. Howes, A. Lahiri, & N. Stern (Eds.), *State-level reform in India: Towards more effective government* (pp. 257–267). New Delhi, India: Macmillan India.

Bhatnagar, S. (2003b). Public service delivery: Does e-government help? In S. Ahmed & S. Bery (Eds.), *The Annual Bank Conference on Development Economics 2003* (pp. 11–20). New Delhi: The World Bank and National Conference of Applied Economic Research.

Bhatnagar, S. (2003c). *Transparency and corruption: Does e-government help?* Draft paper for the compilation of the Commonwealth Human Rights Initiative 2003 Report 'Open Sesame: Looking for the Right to Information in the Commonwealth'.

Bhatnagar, S. (2003d). *The economic and social impact of e-government*. Background technical paper for e-government, the citizen and the state: Debating governance in the information age, the proposed UNDESA publication (World Public Sector Report for 2003).

Bhatnagar, S. (2003e). *Role of government: As an enabler, regulator, and provider of ICT based services*. Asian forum on ICT policies and e-strategies, Asia-Pacific Development Information Programme, United Nations Development Programme.

Bruhat Bengaluru Mahanagara Palike. (2009). BBMP delimitation 2009. http://www.bbmpwards.org/

Ciborra, C., & Navarra, D. D. (2005). Good governance, development theory and aid policy: Risks and challenges of e-government in Jordan. *Information Technology for Development, 11*(2), 141–159.

Crozier, M., & Friedberg, E. (1980). *Actors and systems*. Chicago: University of Chicago Press.

Dada, D. (2006). The failure of e-government in developing countries: A literature review. *The Electronic Journal on Information Systems in Developing Countries, 26*(7), 1–10.

Downs, A. (1964). *Inside bureaucracy*. Boston: Little Brown.

Dutton, W. H. (1992). The ecology of games shaping telecommunications policy. *Communications Theory, 2*(4), 303–324.

Dutton, W. H., & Guthrie, K. (1991). An ecology of games: The political construction of Santa Monica's public electronic network. *Informatization and the Public Sector, 1*(4), 279–301.

Eisenhardt, K. M. (1989). Building theories from case study research. *The Academy of Management Review, 14*(4), 532–550.

Fife, E., & Hosman, L. (2007). Public private partnerships and the prospects for sustainable ICT projects in the developing world. *Journal of Business Systems, Governance and Ethics, 2*(3), 53–66.

Firestone, W. A. (1989). Educational policy as an ecology of games. *Educational Researcher, 18*(7), 18–24.

Fountain, J. E. (2001). *Building the virtual state: Information technology and institutional change*. Washington, DC: Brookings Institution.

Fountain, J. E. (2002). A theory of federal bureaucracy. In E. Kamarck & J. S. Nye Jr. (Eds.), *Governance.com: Democracy in the information age* (pp. 117–140). Washington, DC: Brookings Institution.

Gascó, M. (2003). New technologies and institutional change in public administration. *Social Science Computer Review, 21*(1), 6–14.

Hartley, J. (2005). Case study research. In C. Cassell & G. Symon (Eds.), *Essential guide to qualitative methods in organisational research* (pp. 323–333). London: Sage Publications.

Heeks, R. (2002a). I-development not e-development: Special issue on ICTs and development. *Journal of International Development, 14*(1), 1–11.

Heeks, R. (2002b). Information systems and developing countries: Failure, success and local improvisations. *The Information Society, 18*, 101–112.

Heeks, R. (2003). *Most eGovernment-for-Development Projects Fail: How Can the Risks be Reduced?* (iGovernment Working Paper Series—Paper No. 14), University of Manchester.

Heeks, R. (2006). *Implementing and managing eGovernment—An international text*. New Delhi, India: Vistar Publications.

Long, N. E. (1958). The local community as an ecology of games. *The American Journal of Sociology, 64*(3), 251–261.

Madon, S. (2004). Evaluating the developmental impact of e-governance initiatives: An exploratory framework. *Electronic Journal of Information Systems in Developing Countries, 20*(5), 1–13.

March, J. G., & Olsen, J. P. (1989). *Rediscovering institutions: The organisational basis of politics*. New York: The Free Press.

Margetts, H. (2006). Transparency and digital government. In C. Hood & D. Heald (Eds.), *Transparency: The key to better governance?* (pp. 197–210). London: The British Academy.

Ndou, V. (2004). e-Government for developing countries: Opportunities and challenges. *The Electronic Journal on Information Systems in Developing Countries, 18*(1), 1–24.

North, D. C. (1990). *Institutions, institutional change, and economic performance*. Cambridge: Cambridge University Press.

Parthasarathy, B. (2013). The ICT services industry in Bangalore, India: Its changing structure and characteristics. In H. Hirakawa, K. Lal, S. Naoko, & N. Tokumaru (Eds.), *Servitization, IT-ization, and innovation models: Two-stage industrial cluster theory* (pp. 87–105). Abingdon, England: Routledge.

Ravishankar, M. N. (2013). Public ICT innovations: A strategic ambiguity perspective. *Journal of Information Technology, 28*(4), 316–322.

Sarangamath, S. (2007). BangaloreOne: Integrated citizen service centre. In A. Agarwal (Ed.), *EGovernance case studies*. Hyderabad, India: Universities Press.

Stanforth, C. (2006). Analysing eGovernment in developing countries using actor-network theory. iGovernment working paper series—Paper no. 17.

Stanyer, J. (1979). *Understanding local government*. London: Fontana Press.

The Times of India. (2006, July 22). E-governance and GIS: The new face of BMP, 1.

Thomas, J. M., & Bennis, W. G. (1972). *The management of change and conflict: Selected readings*. Harmondsworth, England: Penguin.

Virkar, S. (2004). *Exploring the digital divide: Are developing countries losing out in the Digital Age?* Unpublished M.A. Dissertation, University of Warwick: Coventry.

Virkar, S. (2011). *The politics of implementing e-government for development*: *The ecology of games shaping property tax administration in Bangalore city*. Unpublished doctoral thesis, University of Oxford, Oxford.

West, D. A. (2004). E-government and the transformation of service delivery and citizen attitudes. *Public Administration Review, 64*(1), 15–27.

Yin, R. K. (2003). *Case study research: Design and methods* (Applied social research methods series, Vol. 5). London: Sage Publications.

Chapter 10
Context-Aware Mobile Interface Design for M-government

Hana Al-Nuaim

1 Introduction

The 2010 United Nations E-Government Survey revealed that citizens are benefiting from enhancements to e-government services and advanced e-service delivery within their countries, allowing them to have better access to information and more effective interactions with their governments (United Nations 2010). As a result of the increasing use of information and communication technologies (ICT) general public or state institutions who are reducing their personal contact with citizens published a tremendous amount of information online. Many national governments went beyond basic websites providing national portals that serve as a major starting point for users to access government e-services in different ministries or government offices (United Nations 2010).

Most well-developed e-governments are now offering many advanced e-services to citizens related to (OECD/International Telecommunication Union 2011):

- General information (e.g., weather, tourism, public safety, contact information, regulations)
- Specific information (e.g., events, news, road closures, schedules, schedules, fee changes, account information, traffic, transportation schedules)
- Emergency and safety alerts (e.g., storms, tornados, terrorism, accidents)
- Notifications (e.g., traffic violations, registrations and renewals, deadlines, security notifications)
- Health services (e.g., fill-in forms, outbreaks, promotions and drives, prevention)
- Education services (e.g., admissions, exam results)

H. Al-Nuaim (✉)
Computer Science Department, King Abdulaziz University,
Jeddah, Saudi Arabia
e-mail: hnuaim@kau.edu.sa

S. Saeed (ed.), *User-Centric Technology Design for Nonprofit and Civic Engagements*,
Public Administration and Information Technology 6, DOI 10.1007/978-3-319-05963-1_10,

Table 10.1 Mobile services evolution in key performance metrics (2008–2018)

Key performance metrics	1998	2008	2018 (Estimated)
Mobile penetration–global	5 %	55 %	96 %
High GDP per capita nations/ Total mobile subscriber base	75 %	24 %	15 %
Mobile data services revenues	4 %	19 %	40 %
Networks	1G & 2G	2.5G & 3G	5G & 6G
3G+Penetration	0 %	18 %	90 %
Network speeds	<50 kbps	Up to 2 Mbps	Up to 1 Gbps
Devices ASP	USD 200	USD 130	<USD 20
Smartphone penetration	<1 %	10 %	40 %
Average battery life	2 h	2.5 h	24 h

Source: OECD/ITU (2011)

- Security services (e.g., crime reporting, service requests, law enforcement, assistance requests)
- Filing claims and reporting problems (e.g., service disruptions, suspicious activity, voting, and complaints about officials)

By the year 2015, the United Nations expects that there will be over 358 "million cities" with one million or more people and 27 "mega-cities" with ten million or more, and much of this growth will occur in developing countries (Freire 2006). E-government is effective only when city infrastructures are capable of delivering timely information and services to citizens and when the citizens themselves have the means to access e-government resources. For some developing countries with limited ICT infrastructure, access to e-government services is still difficult in locations where most of the populace are poor and public resources are either insufficient or scarce; yet their mobile phone use is higher than Internet penetration (Molin-Juustila et al. 2008; Kumar and Sinha 2007). This growth in mobile usage can be seen worldwide, and in some countries it has been exponential (Table 10.1), where the young, old, rich, poor, male, and female all use mobile phones. In 2013, the number of active mobile subscriptions reached 6.8 billion, corresponding to a global penetration of 96 % billion worldwide, where more than 80 % of those users living in rural areas have access to mobile networks (OECD/International Telecommunication Union 2011; ITU 2013).

Mobile phones are becoming the fastest and most widely used technology in history due to their personalization and ease of use (OECD/International Telecommunication Union 2011). Due to their widespread use and with an abundance of Wi-Fi hotspots throughout the city, barriers for citizen participation are removed, empowering them to quickly and efficiently connect to e-government services including health, education, employment, and public safety options, financial and transportation information, legal issues, and much more (OECD/International Telecommunication Union 2011). Smart mobile devices can be perceived as sensor nodes and location-aware data collection instruments due to their increased capabilities of capturing, classifying and transmitting image, location, acceleration and other data (Till et al. 2012).

2 Research Objective

For the purposes of this chapter, a city is defined as any population-dense, integrated human settlement located within a limited geographic area with a population large enough to sustain a city government capable of providing an online version of government services and resources that support citizens' needs. Replicating the desktop experience of government e-services is, however, not sufficient in addressing the needs of the mobile user within the city, because the design of online e-government services does not transfer well to mobile devices—just as paper-based services do not transfer well to an online environment. Therefore, new practices are needed to accommodate the impact of users' behavior and their location on interactions with m-government applications. Unfortunately, while user interactions with mobile devices in the real world usually occur in context-rich environments (Barnard et al. 2007), many mobile applications are designed as though they will be used in traditional desktop settings (Savio and Braiterman 2007). In addition, their evaluation studies are conducted in static or ideal conditions (Barnard et al. 2007). As a result, the impact of the change in context on the user's ability to successfully interact with mobile applications is neither well understood nor analyzed (Barnard et al. 2007). Reviewing the literature reveals that research in the relatively new field of context awareness and designing mobile user interfaces concentrates on system-level development or context recognition, while human–computer interaction and usability issues have only seldom been explored and investigated (Häkkilä 2007). Context awareness, however, is a growing field and increasingly gaining applicability in interactive ubiquitous mobile computing systems (Musumba and Nyongesa 2013).

The objective of this chapter is to identify issues and raise awareness of potential challenges that user-interface designers need to consider while adapting the content of municipality and city e-government services and applications to the context-aware interactions of citizens with mobile devices. This chapter concludes with context-oriented best practice m-government guidelines that need to be considered when adopting applications which would help city governments in the delivery of more efficient e-services to mobile citizens.

3 Theoretical Overview

E-participation can be defined as the electronically supported methods that decision-makers use to interact and consult with citizens and nongovernmental organizations (Lahti et al. 2006).

Citizen participation consists of permitting those affected by a decision to contribute to that decision in the areas where they live and work (Suh 2005). Some of the advantages of citizen participation are as follows (Tang 2006):

- Revealing the interests of the citizens in proposed plans and giving them social legitimacy

- Empowering citizens in remote locations by allowing them to monitor corrupt or unauthorized decisions or illegal development in their neighborhoods
- Offering input regarding the validity of proposed neighborhood designs, as city residents know their neighborhood more intimately than city officials and planners and are aware of local issues that may affect design strategies
- Allowing new ideas to emerge from discussions with citizens of local communities

3.1 Mobile Governments (M-governments)

While web-based interactions between citizens and their city governments have proven to be reliable for many e-government systems, mobile-based interactions are far more complicated (Zefferer 2011). The fundamental difference between e-government and m-government is in their provision of services. While e-government involves the electronic delivery of information to geographically diverse but technologically homogenous ICTs, m-government involves interactions in which the users' contexts are unknown limiting the amount and type of information that might be located and accessed due to physical constraints in the environment while they interact with their mobile devices (OECD/International Telecommunication Union 2011). Context awareness becomes important when the citizens may have to provide, or be asked for, information about their present state such as collisions, traffic jams, fire, weather-related damage, riots, and other urgent situations (Ariza Avila 2006). The challenge is to allow citizens to respond instantly to such situations while they are in the right place and at the right time. That type of spontaneous and impulsive reaction can be seen as a new application area for citizen participation inside their community (Ariza Avila 2006).

M-government is a subset of e-government that utilizes mobile phones and wireless technologies like 3G, Bluetooth, GPRS, and Wi-Fi. Delivering these public services poses challenges with regard to both their implementation and their acceptance (Kumar and Sinha 2007). Still, city governments should invest heavily in m-government because it offers extensive possibilities for electronic interactions between citizens and local city authorities. However, spontaneous participation on the part of citizens involves two somewhat contradictory requirements (Ariza Avila 2006):

1. It is imperative to acquire information from citizens about their situations, which may be in the form of data submitted (pictures or messages) or contextual (time and location of the participation), so as to allow citizens to react appropriately, immediately, and in the right place and at the right time. This information can then be used to provide many useful new services for citizens.
2. Spontaneous and impulsive participation requires simple and easy-to-use interaction techniques in order to capture, attract, and maintain user engagement as much as possible.

Citizens as well as the municipality or the city government would benefit from using contextual information with regard to quickly resolving problems and simplifying the process for both citizens and governments, encouraging their participation by making it easy for them to access services (Ariza Avila 2006). Contextual data can be obtained from physical sensors, such as for temperature and pressure, from computed information such as time and date, or by being explicitly provided to the application in the form of user preferences (Mostéfaoui et al. 2004). Smart spaces are provided with sensors that acquire contextual information such as light intensity, noise levels, temperature, and location (Ariza Avila 2006). However, cities are not smart spaces and do not have an infrastructure for context sensing and acquisition; if some sensing devices do exist in cities, they are often inaccessible, obstructed, or unusable (Ariza Avila 2006). Urban sensing use embedded networked sensing in a real-world environment in the form of mobile phones (Till et al. 2012).

Zefferer provides a list of worldwide mobile service projects specifically targeted for students, farmers, or citizens for specific issues such as flood warnings for Venice residents (Zefferer 2011). A successful example is the US government's dedicated website (apps.usa.gov), which launched a variety of applications that allow smartphone users on the move to access its services, from finding the nearest location of interest to inquiring about the UV index in a given city (OECD/International Telecommunication Union 2011).

Over the last few years, some municipalities have capitalized on citizens' interaction with their mobile phones such as (Till et al. 2012): (1) The NYC311 service in New York City, which has an official iPhone app, allows residents to report various emergency local problems, uploading pictures of potholes or videos of damage or sabotage, for example; (2) Street Bump in Boston uses a mobile device's accelerometer to report street damage based on a driving vehicle's location and acceleration profiles; (3) PEIR, tested at the University of California, Los Angeles, is a system that uses GPS data from mobile phones and mathematical models and algorithms to determine the users' method or means of transportation and travel routes; (4) the CarTel project at the Massachusetts Institute of Technology uses location data from mobile phones as input to algorithms for traffic analysis, prediction, and accordingly provides traffic-routing suggestions. Cities are also using mobile devices to monitor ongoing programs such as a GPS-based system in the city of Auckland used to monitor its employees' activities and resources (Raja et al. 2012).

3.2 Mobile Phones and the User Experience

It is evident that mobile applications on smartphones are revolutionizing the entire mobile market by linking a hardware device to a content delivery platform enabling a powerful hardware/content combination (OECD/International Telecommunication Union 2011). Such a combination removes one of the main challenges within the industry of how to generate revenue using mobile applications and content (OECD/International Telecommunication Union 2011). The 2010 Adobe Mobile Experience

Survey measured mobile user characteristics, behavior, preferences, satisfaction levels, and other experiential factors across four key consumer categories: (1) media and entertainment; (2) financial services; (3) travel; and (4) consumer products and shopping (Adobe Systems 2010). The study surveyed 1,200 US consumers across different age groups and types of mobile device they own. The survey's key findings were as follows:

- Media and entertainment is the most penetrated category, both in terms of the number of users and in terms of time spent; consumer products and shopping is the category that is the least penetrated in terms of the number of users.
- Respondents generally favor the browser experience over downloadable mobile apps (applications), except when it comes to games, social media, maps, and music.
- Overall, respondents reported equal satisfaction levels with their browser and app experiences, spending nearly equal amounts of time interacting with each.
- Accessing maps and directions is the number one mobile activity (81 %), followed by three media-related activities: social networking (76 %), accessing local information (73 %), and reading news (68 %). The top mobile financial activity is reviewing bank account information (67 %).

The 2010 survey study conducted by Adobe concluded that mobiles are paving the way for the more widespread adoption of services and behavior that, until recently, have been the purview of desktops, and that learning how users are interacting with mobile devices is crucial (Adobe Systems 2010). The high demand for smart mobile devices with many features and the competition between hardware and software has driven the market at a fast pace, while research on the user experience has lagged behind. Media, entertainment, and social networking companies have the ability to invest in transferring their users' experiences from the web to a mobile environment since their reach may be in the hundreds of millions. For city governments, however, the cost may not justify such an investment due to limited technical know-how, limited user reach, limited funds, and a lack of usability specialists. As a consequence, city governments often simply transfer their web application to a mobile device interface in which users scroll up and down and right to left, filtering out unnecessary information. If we imagine an emergency situation in which citizens need to report a complaint or are in need of help, browsing the mobile app as designed for the a desktop device defeats the purpose of providing citizens with real-time data and information anytime, anywhere, and when they need it most.

User needs and preferences, quality and user-friendly applications are critical success factors for m-government and emphasize the fact that m-government applications should be driven primarily by the needs of the user (Zefferer 2011). As mobile computing grows more complicated for multiple-use contexts, user-interface designers have several unique challenges, as users may move between different platforms while carrying out different tasks in different environments (Eisenstein et al. 2000). User interfaces need to adapt to the user settings by presenting functionality and information that is relevant only in specific circumstances, thus reducing the demand for user interaction (Kjeldskov and Paay 2005).

Adapting the interface to its context facilitates the partial automation of trivial and repetitive tasks, enabling the system to react to contextual changes while increasing the security of data and of users (Kjeldskov and Paay 2005). Context-aware applications on mobile computer systems can discover and take advantage of contextual information, such as the user's location, nearby people and devices, time of day, user activity, in addition to light and noise levels (Chen and Kotz 2000). A recent study of m-government developed a measurement framework for the identification/categorization of m-government services; the sophistication stages of these services; and indicators to evaluate their progress (Stiakakis and Georgiadis 2012). This study found that modification in the sophistication model for e-services should be user-focused, in accordance with the personalized nature of services delivered through mobile devices (Stiakakis and Georgiadis 2012).

4 Challenges for Context-Aware Design

The "design challenge for mobile context is the artful combination of effective visualization of sensor information, user provided content (text, speech or photos) and easily selecting when and with whom you share what" (Mirisaee et al. 2011). User-interface designers of mobile devices must consider (1) the mobile device: content needs to adapt to screen resolution, color depth, and screen surface, and dialogues must adapt to network bandwidth; (2) usability and the user's experience: adapting to user skills, experience level, task experiences, and preferences; and (3) the interaction: methods that remember interaction techniques previously used, location, and windows sizes (Eisenstein et al. 2000).

Upon a review of the literature, it is clear that the challenges of the context-aware issues that designers face can be categorized into three groups: the mobile device and user behavior while using it, the usability of the design, and user interaction.

4.1 Context Design and the Mobile Device

Mobile technology has a rather complex system architecture with several underlying layers, such as sensor technologies, and inferred logic design (Häkkilä 2007). In addition to these technical challenges, there also exist user-related and context-related issues that affect the interaction design (Häkkilä 2007).

Designing quality mobile web applications is complicated because mobile user interfaces are a new paradigm for user interaction due to the following main differences between desktop and mobile platforms (Lentz 2011; Devlin 2011):

- Mobile device hardware is smaller with generally fewer hardware resources than desktops and laptops.
- Smaller screens generate different design challenges and considerations, limiting the information that can be legibly displayed (as depicted in Fig. 10.1).

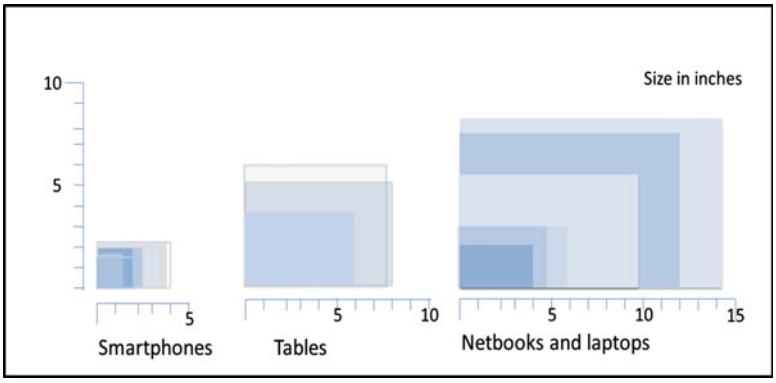


Fig. 10.1 Mobile device displays, relative sizes (Lentz 2011)

In addition, texts and images can quickly fill the limited screen space, causing a trade-off between content and user interactions.

- Touchscreens used for interaction with the interface introduces new interaction concepts that differ from traditional input devices such as the keyboard and mouse. They use bigger hit areas optimized for fingertips, making them easier to use yet, fingers and hands obscure more of the screen on a user interface than does a mouse pointer icon. While some mobile devices have a physical keyboard, most only have a virtual keyboard to handle different types of displays without overcrowding the screen or stretching the content by using more grid-based button layouts and presenting controls within the application that are similar to mobile apps.
- Internet connectivity for mobile devices is a concern because it is not always as reliable as a hard-wired broadband connection, which means data transfer is significantly slower.
- Operating system diversity in mobile devices determines the following:
  - *Navigation*. For example, Blackberry phones uses gestures, widgets, and hardware buttons for the menu and for escaping, while Android phones use gestures, widgets, and hardware buttons for home, back, menu, and search.
  - *Control implementation*. The operating system relies heavily on software control features like virtual buttons. Both Blackberry and Android devices may have physical buttons for navigating back to the previous screen and for opening option menus. In iPhone and iPod Touch applications, tab buttons are placed at the bottom so that the users can easily glide over the screen using their thumb.
  - *Visual style*. An aesthetic choice through color themes, icon styles, and metaphors.

4.2 Context Design and Usability

The key potential usability risks for designing the user interface of a mobile, context-aware application are (Dey and Häkkilä 2008):

- Uncertainty in context recognition can be caused by different factors including inferring logic, detection accuracy, or information fusion, as it affects the selected features as well as their functionality and accuracy. Features such as the proactivity level may be designed differently, in practice, if the confidence level in context recognition can be correctly estimated.
- Application complexity grows the more functions are added, causing a potential risk for context-aware applications, as they use a greater number of information sources than traditional mobile applications.
- The absence of standardization in this field results in poor interoperability of services and applications and it limits the application design, available services, and the seamless interaction that is anticipated across a wide range of devices and users.
- The subjective understanding of context attributes and measures such as light intensity or noise level in everyday life creates a problem for user-interface design, as these attributes are not commonly understood by end-users.
- Context-triggered actions when executed proactively may easily result in a lack of user control with mobile device automation.
- The constant mobility of the user creates problems related to user focus and interaction, which are prone to error and accidental selection.

4.3 Context Design and Interaction

Due to the context of use and given the interactional perspective, successful mobile interactions are expected to be different from the desktop experience, as proposed by the theory and practice of human–computer Interaction. Table 10.2 presents the differences between the user experience for mobile and desktop uses (Lentz 2011).

In particular, the problems that developers face regarding context design for interaction are listed below (Savio and Braiterman 2007; Dey and Häkkilä 2008):

1. All mobile interactions are user-driven. The most successful strategy so far has been entertainment content, such as video clips, ring tones, wallpapers, games, and social networking.
2. Context often derives from devices that developers have little experience with, unlike their experience with the mouse and keyboard.
3. Raw sensor data must often be abstracted in order to be transformed into a useful context; otherwise, the data may not directly be useful to an application.
4. Context comes from multiple distributed and heterogeneous sources, which often need to be combined to produce useful data.

Table 10.2 Mobile and desktop experience differences

Mobile	Desktop
Short, focused interactions	Continuous interaction for a single task
Ex: Responding to a tweet or SMS	Ex: Writing notes
More disruptive interruptions on device	Less disruptive interruptions
Ex: Receiving a call while reviewing mail on smartphone	Ex: Having a phone conversation while checking e-mail on a laptop
Constantly changing environmental context	Infrequently changing context
Ex: Using a phone during travel	Ex: Using an application at a desk
More transactional interactions	Supports non-transactional interactions
Ex: Checking weather forecast	Ex: Composing a document
Viewing dominates interacting	Balanced viewing and interacting
Ex: Looking at photos	Ex: Editing photo
Page loads are more disruptive	Page loads are less disruptive
Ex: Mobile Web-browsing experience	Ex: Desktop Web-browsing experience
Simplicity of experience	More tolerant of complexity
Ex: Reading an e-book	Ex: Using a word processing application
Relatively poor response time	Good response time
Ex: Map updating	Ex: Highly immersive gaming
Relatively poor response time	Good response time
Ex: Map updating	Ex: Highly immersive gaming
More social	Less social
Ex: Relative importance of phone, texting, and social network applications	Ex: Relative importance of office productivity applications

5. Context, by its very nature, is dynamic; changes in it must be detected in real time. To provide a positive experience for users, applications must adjust to these constant changes.
6. New mobile experiences compete with well-known user models. As mobile services expand, design must take into account customers' dependence on user models that are based on prior technologies. On the web, ease of use is vital and can be accomplished by limiting choices and guiding navigation. On a mobile phone, adjustments must be made for background noise, interruptions, environmental distractions, and many usage contexts that often require single-hand operations.
7. Mobile devices are in closer proximity to users for more parts of the day than are personal computers, and they compete with many other demands on users' attention.
8. The device is a continuous companion that offers a realm of mobile experiences of different intensities and durations, such as text messaging and playing games.
9. Mobile interactions can extend beyond the device. Some users tend to access information on the web from a personal computer and see the results displayed on a mobile phone.
10. Mobile interactions are often small, and many interactions must be intuitive and rapid. For example, when searching for an address to avoid being late for an appointment, there will be a low threshold for learning or registering.

There are also other obstacles to retrieving data and locating a destination compared to those on the web.

11. Peer-to-peer is the most trusted form of mobile marketing. Mobile phone users are more likely to respond to messages they received from friends. Mobile social networks facilitate decision-making in many locations and contexts, creating new "mixed realities" and blending virtual and in-person realms.

5 Recommended Design Guidelines for M-government

Users see mobile devices as communication and leisure tools for fun and entertainment more than for serious activities, but government business requires a series of tasks involving difficult choices that could be life-threatening (OECD/International Telecommunication Union 2011). So, in order for designers to utilize such technology in the face of these significant challenges, they transfer online applications using automated tools called "mobile site builders," like WIRENODE, MobilePress, WP-TAP, WP-TOUCH PRO, Mobify, and MoFuse, that enable websites to be responsive to any device, whether mobile, tablet, or iPad. However, without designer involvement in reducing and redesigning content, the use of mobile builders can be the worst option for users. Only a few of these tools allow designers to actually pick elements to be displayed, while the rest automatically create the mobile version, without any designer contribution adding insignificant elements for a mobile version.

With a lack of expertise within the municipality and lack of funding to have professionals redesign their websites, this research recommends different options that developers have when planning to redesign their e-city websites to accommodate mobile usage. These recommendations may not address all the challenges but could reduce them considerably. The website needs to be prepared to be transformed by following guidelines for content, browser-to-device compatibility, screen size, and links to context awareness.

5.1 Content

Two of the technical and policy considerations related to m-government are content and presentation management. By utilizing content management systems (CMS), a formal structure to the content will be added in order to adopt enterprise-wide web and content design standards (Hassan et al. 2009). The management application must be able to communicate with other applications using open standards (e.g., Web Services, CORBA, Java RMI) to allow the use of the contextual information (Ariza Avila 2006).

In addition, location awareness and personalization techniques ensure delivering the right service to the right users by selecting only the most necessary services, such as reporting and receiving warnings, alerts, health emergencies, and payment

for urgent violations, while routine information and forms should be reserved for the desktop (Hassan et al. 2009). A careful analysis of what types of services should be offered should be conducted for each municipality on an individual basis; one size does not fit all because each city has its own unique character, challenges, resources, technical infrastructure, and digital culture, all of which affect the types of services that should be provided on a mobile device. Therefore, designers need to have a logical architecture for governmental location-based services to maximize the ultimate effectiveness of m-government services and to enable matching the best service options with the targeted user (Hassan et al. 2009).

5.2 Browser Support

There are three main options for supporting mobile browsers (Sanderson 2011), which are listed below.

- *Option 1*. The cheapest option for implementation and maintenance is to simply create a standard, desktop-based web application using mobile builders and rely on mobile browsers to render it. This would be the worst end-user experience because users will still be forced to zoom and scroll horizontally and vertically to access the content on a small screen.
- *Option 2*. With the careful use of markup, styles, and scripts, it is possible to adapt the interface to whatever browser is running and optimize rendering for the specific device in use. This option easily allows sharing of server-side logic across all device types with minimal duplication of code or effort. But it provides no support for varying server-side logic and workflows for different devices, and it may not be possible, for example, to implement a simplified shopping cart check-out workflow for mobile users. In addition, with inefficient bandwidth use, servers may have to transmit the markup and styles that apply to all possible devices, even though the target device will only use a subset of that information.
- *Option 3*. If the server knows the characteristics of the device it is accessing, such as its screen size and input method, it can run different logic and output different HTML markup. The server need only transmit the markup and styling information that the target device is going to use thus providing maximum flexibility and efficient bandwidth use. However, it sometimes forces repetition of effort or code, and device detection is not trivial because it requires a list or database of known device types and their characteristics; which may not always be current and not guaranteed to accurately match every incoming request.

5.3 Screen Size

In a typical desktop website layout, the interface would have content and navigation objects, where the primary navigation is presented on top and a secondary

navigation is a list of options in the left-hand column of the page. For a mobile device, the navigation panes need to be reduced to a single navigation column to avoid as much as possible scrolling left to right and up and down. The top part of the screen is prime real estate on a mobile phone and should be reserved for the most important content, while navigation elements should be placed on the lower part of the screen.

Because typing while on the move is prone to error, it should be minimized. Users are best served by being able to choose options and have their data stored in their accounts (Warsi 2011). Furthermore, the most common difficulty with interaction with small touchscreens is in selecting, and in particular, tapping small text links accurately, because fingers tend to be too thick to hit a small link accurately; and it is easy to accidentally tap the wrong choice if there are two or more links in close proximity (Warsi 2011).

5.4 Links to Context Awareness

Häkkilä (2007) examined situations and needs in which context-awareness phenomena can assist in overcoming several challenging issues that relate to user interaction with mobile handheld devices (Table 10.3).

Table 10.3 Phenomena and their links to context awareness (Häkkilä 2007)

Phenomenon	Consequence	Link to context awareness
Increasing complexity of the devices	An increased number of applications while device settings get more complex	There is a need to quickly access applications and menus and to simplify setting structures and automatic configuration of settings
Small device size	Limited input and output functionality	There is a need for more efficient input methods due to slow input techniques and long navigation paths. Content has limited space, and the device should be able to decide what is relevant to display
Computing and battery power are limited	A limited number of actions or processes can run simultaneously	There is a need for appropriate device resource management according to the user's situation
A growing number of mobile services	The possibilities for device usage can be multiplied	There is a need for users' ability to select only relevant services and to use them efficiently
Unpredictable human behavior	The device should support users' fallible memory and their and dynamically changing intentions	There is a need for memory aids, reminders, and prescheduled actions to support flexible management of actions

6 Conclusion

Technology support for nonprofit or government sectors is an important yet relatively new field of research due to the increased significance of citizen participation in the political process driven by the power of social media and the use of mobile devices. In order to design appropriate technological support for such settings, it is important to understand their structure, work practices, traditional platforms for communicating with the public, and current popular technological usage trends.

The aim of every city government should be to remove barriers and empower citizens to quickly and efficiently connect to their e-government for services such as health, education, employment, public safety, transportation, and legal issues. Mobile devices have become common tools for service delivery because of their ease of use, their wider reach, and the lower cost of handsets. City governments continue to explore and invest heavily in m-government services and applications by utilizing mobile phones and/or wireless technologies to deliver e-services more efficiently. This offers extensive possibilities for e-communication between citizens and city authorities. Replicating the desktop experience for e-government, however, is not sufficient for accommodating the interaction s of the mobile user, because user interactions with mobile devices in the real world usually occur in context-rich environments; therefore, new practices are needed to understand the impact of users' location and behavior on interactions with m-government applications.

Media, entertainment, and social networking companies can invest in transferring their users' experience from the web to mobile devices, as their reach may be in the hundreds of millions. For city governments, however, the cost may not justify such an investment, due to the limited technical know-how of their developers, limited user reach, limited funds, and a lack of usability specialists. So, the most common practice of municipalities of simply transferring web-based e-government services to mobile devices is considered inefficient because the capabilities of mobile devices differ from those of desktop environments and because users' preferences for using their devices vary.

Due to issues of context, the purpose of this research is to alert m-government user-interface designers and developers not to simply use mobile builders to transform an existing website into a mobile version; they must fully understand the usability risks and challenges involved in providing users with an efficient and comfortable experience. Designers and developers need to follow best practices and software engineering lifecycle methods in designing applications by prototyping and conducting testing with users for different mobile platforms. Although the target users of e-government and m-government are the same, their interactions with the applications and their context of use are completely different. They therefore require a completely dedicated, user-centered design approach for building applications for mobile devices and context of use.

This chapter presented the design challenges involved in building e-government applications for mobile use that far exceed those of desktop websites applications. By following these proposed guidelines for content, browser-to-device compatibility,

and screen size, designers may not solve all problems encountered but can reduce them considerably.

As much as context awareness can help in overcoming several problematic issues that relate to user interaction with mobile devices, context-awareness information about the user, the environment, and the device is still prone to error and unreliable and should be used only when absolutely necessary. Mobile technology, in the meanwhile, is growing rapidly, and city sensory data can provide necessary context-aware data for mobile services. The challenge that remains for designers of mobile apps is to integrate context data and tools in a way that is easy for users on the move to learn and use in a smart, interactive city.

References

Adobe Systems. (2010). *Adobe mobile experience survey: What users want from media, finance, travel and shopping*. http://www.keynote.com/docs/news/AdobeScene7_MobileConsumerSurvey.pdf

Ariza Avila, C. (2006). *Application of a context model in context-aware mobile government services*. Dissertation, Universidade do Minho. http://repositorium.sdum.uminho.pt/bitstream/1822/7179/3/TeseCesarAriza.pdf

Barnard, L., Yi, J., Jacko, J., & Sears, A. (2007). Capturing the effects of context on human performance in mobile computing systems. *Personal and Ubiquitous Computing, 11*(2), 81–96.

Chen, G., & Kotz, D. (2000). *A survey of context-aware mobile computing research*. Dartmouth Computer Science Technical Report TR2000-81. http://www.cs.dartmouth.edu/reports/TR2000-381.pdf

Devlin, A. (2011). *Building mobile web apps the right way: Tips and techniques*. http://sixrevisions.com/web-applications/building-mobile-web-apps-the-right-way-tips-and-techniques

Dey, A., & Häkkilä, J. (2008). Context-awareness and mobile devices. In J. Lumsden (Ed.), *Handbook of research on user interface design and evaluation for mobile technology* (pp. 205–217). Hershey, PA: IGI Global.

Eisenstein, J., Vanderdonckt, J., & Puerta, A. (2000). Adapting to mobile contexts with user-interface modeling. *Proceedings of the 3rd IEEE Workshop on Mobile Computing Systems and Applications, Los Alamitos, CA*.

Freire, M. (2006). *Urban planning: Challenges in developing countries*. Human development international congress, World Bank. http://www.reduniversitaria.es/ficheros/Mila%20Freire(i).pdf

Häkkilä, J. (2007). *Usability with context-aware mobile applications: Case studies and design guidelines*. Dissertation, University of Oulu.

Hassan, M., Jaber, T., & Hamdan, Z. (2009). Adaptive mobile-government framework. *Proceedings of the International Conference on Administrative Development: Towards Excellence in Public Sector Performance*. http://www.fifty.ipa.edu.sa/conf/customcontrols/paperworkflash/Content/pdf/m2/en/26.pdf

ITU. (2013). *Global ICT developments*. http://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx

Kjeldskov, J., & Paay, J. (2005). Indexical interaction design for context-aware mobile computer systems. *Proceedings of Context in Mobile HCI, ACM, Salzburg, Austria*.

Kumar, M., & Sinha, O. (2007). M-government: mobile technology for e-government (No. 32-343-2), Computer Society of India, 294–301.

Lahti, P., Kangasoja, J., & Huovila, P. (2006). *Electronic and mobile participation in city planning and management*. Experiences from IntelCities. http://www.hel2.fi/tietokeskus/julkaisut/pdf/Intelcity.pdf

Lentz, J. (2011). *User interface design for the mobile web best practices for designing applications for multiple device platform*. http://www.ibm.com/developerworks/web/library/wa-interface

Mirisaee, S., Brereton, M., & Roe, P. (2011). Bridging the representation and interaction challenges of mobile context-aware computing: Designing agile ridesharing. *OzCHI 2011: Design Culture and Interaction, Australian National University, Canberra, Australia*. http://eprints.qut.edu.au/46885/

Molin-Juustila, M., Nuojua, J., & Kuutti, K. (2008). Urban planning and ubicomp design: Do we need to extend legally enforced participation? *Proceedings of the 5th Nordic Conference on Human–Computer Interaction (NordiCHI): Building Bridges, USA*.

Mostéfaoui, G., Pasquier-Rocha, J., & Brézillon, P. (2004). Context-aware computing: A guide for pervasive computing community. *Proceedings of the 2004 ACS/IEEE International Conference on Pervasive Services (ICPS), Beirut, Lebanon*.

Musumba, G., & Nyongesa, H. (2013). Context awareness in mobile computing: A review. *International Journal of Machine Learning and Applications, 2*(1).

OECD/International Telecommunication Union. (2011). *M-government: Mobile technologies for responsive governments and connected societies*. Paris: OECD. doi: 10.1787/9789264118706-en

Raja, S., Melhem, S., Cruse, M., Goldstein, J., Maher, K., Minges, M., et al. (2012). *Making governments mobile: Information and communication for development 2012: Maximizing mobile*. Washington, DC: World Bank.

Sanderson, S. (2011). *How to add to your ASP.NET Web forms/MVC application*. http://www.asp.net/whitepapers/add-mobile-pages-to-your-aspnet-web-forms-mvc-application

Savio, N., & Braiterman, J. (2007). Design sketch: The context of mobile interaction. *Proceedings of Mobile HCI, ACM, Singapore*. http://69.89.31.51/~deciphe2/giantant/output/mobile_context_model.pdf

Stiakakis, E., & Georgiadis, C. (2012). Building a measurement framework for m-government services. *International Journal of Information Systems and Social Change, 3*(4), 18–37.

Suh, S. (2005). *Citizen participation in promoting citizen participation in e-government: From the Korean experience in e-participation*. http://unpan1.un.org/intradoci/idc_cgi_isapi.dll?IdcService=DOC_INFO&dID=22314

Tang, M. (2006). *Design and implementation of a GIS-enabled online discussion forum for participatory planning*. Thesis, University of New Brunswick. http://gge.unb.ca/Pubs/TR244.pdf

Till, J., Winkler, I., Ziekow, H., & Weinberg, M. (2012). Municipal benefits of participatory urban sensing: A simulation approach and case validation. *Journal of Theoretical and Applied Electronic Commerce Research, 7*(3), 101–120.

United Nations. (2010). *Leveraging e-government at a time of financial and economic crisis*. E-government survey. http://www2.unpan.org/egovkb/documents/2010/E_Gov_2010_Complete.pdf

Warsi, A. (2011). *Seven usability guidelines for websites on mobile devices*. Webcredible. http://www.webcredible.co.uk/user-friendly-resources/web-usability/mobile-guidelines.shtml

Zefferer, T. (2011). *E-government for mobile societies, stocktaking of current trends and initiatives*. http://www.a-sit.at/pdfs/Technologiebeobachtung/mobile_government_1.0.pdf

Chapter 11
Understanding Web Usability Issues: A Case Study of Pakistani Political Parties

Tayyaba Ayub, Kiran Nazeer, and Saqib Saeed

1 Introduction

World Wide Web has become an important sphere for social movements and political activists (cf. Shahizan and Norshuhada 2003; Saeed et al. 2008). Hassan and Li (2000) described that a user has three main goals while visiting any political website. In order to satisfy user needs such website should highlight party's manifestos, updates related to political progress, and information about joining and contributing for the party. Political websites are maintained either by government agencies, political parties, non-governmental organizations, or by individuals. In order to be effective, such websites need to be user friendly (cf. Nielsen 2003; Saeed et al. 2012, 2013; Saeed and Amjad 2013; Youngblood and Youngblood 2013). King (2008) suggested that usability is culture dependent and diversified cultures require content based on their cultural choice. Hassan and Li (2000) emphasized seven major factors to attract masses to a website that include screen appearance, consistency, accessibility, navigation, media use, interactivity, and content. In 2010, a usability study of UK-based political parties' websites proposed 20 best practices to improve website priorities, website support, key users tasks, content, transactional capabilities, and navigation (Web Credible 2010). Furthermore, Aytuna et al. (2008) proposed that data management of political party's website must be of high priority and political culture can play an important role in improving the usage of these websites. Youngblood and Mackiewicz (2012) proposed that minor improvements such as including a home button for navigation and linking the logo with it, underlining the text links, etc. can improve the user experience on such websites. Keeping in view such rapid growth and usage of internet, political parties in Pakistan also focused on its usage to reach to their public or voters and share their agendas and policies

T. Ayub • K. Nazeer • S. Saeed (✉)
Department of Computer Science, Bahria University, Islamabad, Pakistan
e-mail: Saqib.saeed@bahria.edu.pk

S. Saeed (ed.), *User-Centric Technology Design for Nonprofit and Civic Engagements*, Public Administration and Information Technology 6, DOI 10.1007/978-3-319-05963-1_11,

(Saeed et al. 2008). Since there is no research conducted on usability issues of political websites in Pakistan, so we focused on this and conducted a survey.

Remaining of the sections is structured as follows. Section 2 highlights methodology opted to cope with the problem and in Sect. 3 main findings are discussed followed by a conclusion.

2 Methodology and Respondents Profile

According to the results of 2013 general elections in Pakistan, three major parties were Pakistan Muslim League Nawaz (PML-N), Pakistan Tehreek-e-Insaf (PTI), and Pakistan People's Party (PPP) so we focused on the websites of these three parties. We conducted a qualitative study for which a detailed questionnaire was developed aimed at assessing the different usability requirements. Questionnaire comprised of 27 questions and they were mainly rooted in Nielson's heuristics (cf. Nielsen 1994). Each question can be answered against ordered scale of strongly disagree, disagree, uncertain, agree, and strongly agree scales. Twenty-five questionnaires were floated and 20 were received back and were analyzed.

Since Pakistan is having an impact of digital divide so our first question was about the internet usage of respondents. In our survey 14 respondents strongly agreed that they are regular internet users, 2 disagreed, and 4 strongly disagreed as shown in Fig. 11.1.

In order to understand the interest of respondents in politics we found that out of 20, 18 respondents strongly agreed to the importance of casting their votes whereas only 2 disagreed to it as shown in Fig. 11.2.

It is necessary that respondents must have visited any political party website because in that case they can have a better idea of their usability issues. We found that 8 respondents had already visited PTI website, 7 had visited PML(N) website, and 5 respondents had visited PPP website, as shown in Fig. 11.3.

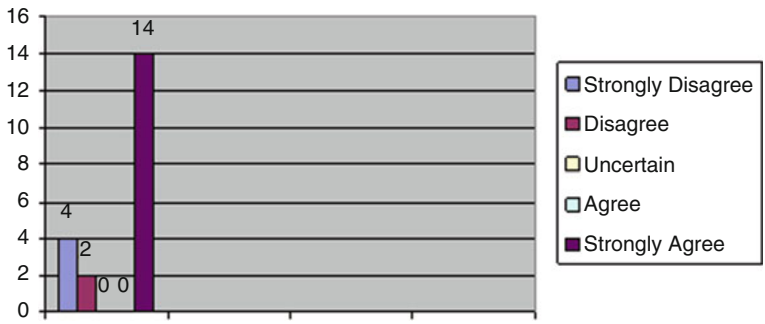


Fig. 11.1 Regular internet user

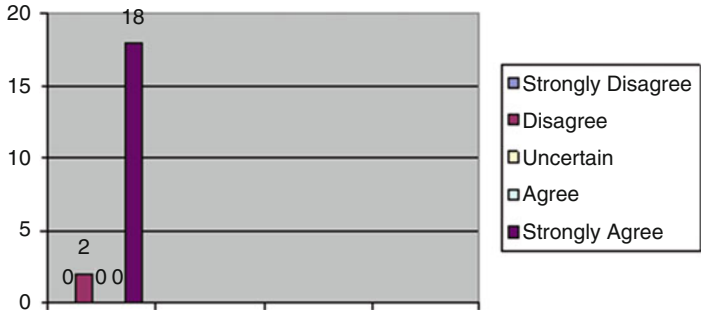


Fig. 11.2 Importance of casting vote

Fig. 11.3 Users prior political web usage

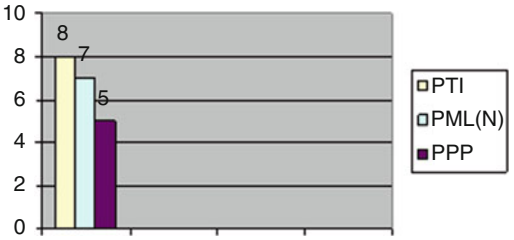
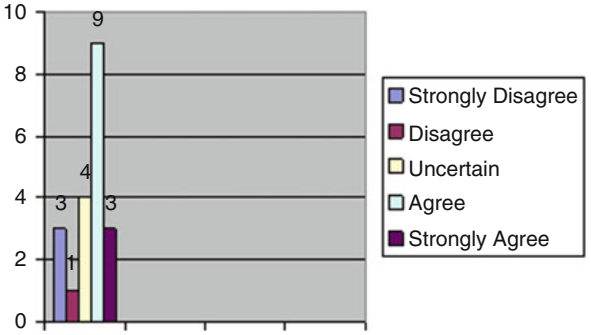


Fig. 11.4 Respondents perception of website



It was also important to understand whether users think that these websites are increasing political party's image or not. In our survey we found that 3 respondents strongly disagreed, 1 disagreed, 4 were uncertain, 9 agreed, and 3 strongly agreed that websites enhance the image of political party, as shown in Fig. 11.4.

3 Survey Results

In order to understand the learnability aspect, we asked from respondents about simplicity of the website. In case of PTI website, 1 respondent strongly disagreed, 1 disagreed, 5 were uncertain, 11 agreed, and 2 strongly agreed that it is simple.

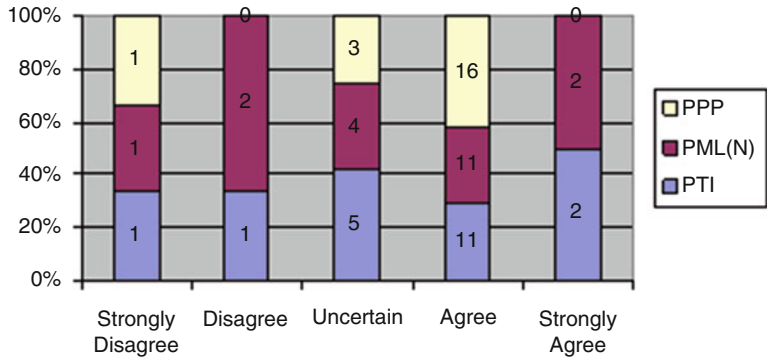


Fig. 11.5 Simplicity of website

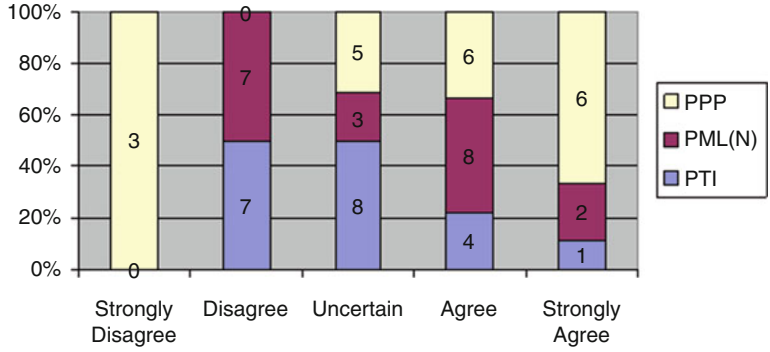


Fig. 11.6 Effectiveness of website

In case of PML(N) website, 2 strongly disagreed, 2 disagreed, 4 were uncertain, 11 agreed, and 2 strongly agreed about its simplicity. In case of PPP website, 1 respondent strongly disagreed, 3 were uncertain, and 16 agreed as shown in Fig. 11.5.

Effectiveness is also an important usability factor; if a user is able to complete his task successfully then website is effective. In case of PTI website, 7 respondents disagreed, 8 were uncertain, 4 agreed, and 1 strongly agreed that this website is effective. For PML(N) website, 7 respondents disagreed, 3 were uncertain, 8 agreed, and 2 strongly agreed whereas for PPP website 3 strongly disagreed, 5 were uncertain, 6 agreed, and 6 strongly agreed, as shown in Fig. 11.6.

Content of website plays a key role in fostering successful usage. For political parties it is important that their goals and manifesto are reflected by content. It should be well managed on appropriate places on their webpages. In our survey we found that in case of PTI website, only 1 respondent found the content irrelevant and disagreed, 4 were uncertain, 14 agreed, and 1 strongly agreed that content is relevant. In case of PML(N) website 2 respondents strongly disagreed, 2 disagreed,

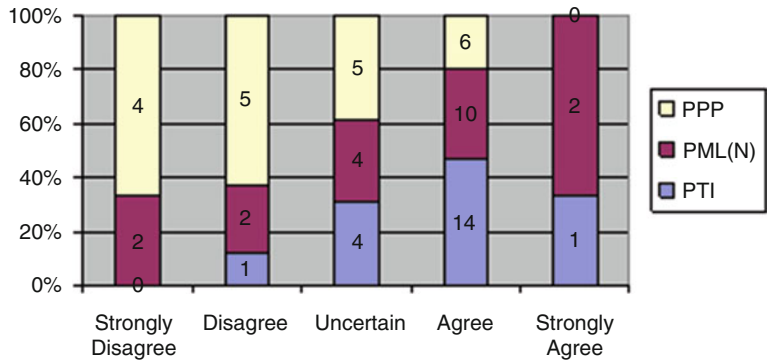


Fig. 11.7 Relevance of content

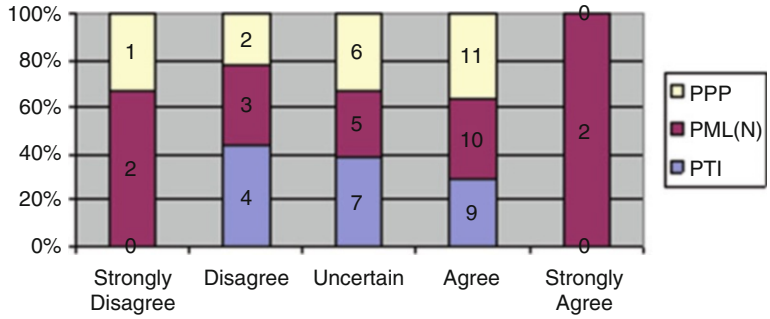


Fig. 11.8 Consistency of website user interface

4 were uncertain, 10 agreed, and 2 strongly agreed about relevance of content whereas for PPP website 4 respondents strongly disagreed, 5 disagreed, 5 were uncertain, and 6 agreed, as shown in Fig. 11.7.

Consistency of a website means how much contents and graphics are coherent, well organized, and helping user during the navigation. In case of PTI website 4 users disagreed, 7 were uncertain, and 9 agreed that its user interface is consistent. For PML(N) website 2 respondents strongly disagreed, 3 disagreed, 5 were uncertain, 10 agreed, and 2 strongly agreed. While for PPP website, 1 respondent strongly disagreed, 2 disagreed, 6 were uncertain, and 11 agreed for consistency, as shown in Fig. 11.8.

Look & feel of the webpage should be appealing to attract users. In our survey we found that in case of PTI website, 4 respondents disagreed, 5 were uncertain, 9 agreed, and 2 strongly agreed that the website has a good look and feel. For PML(N) website, 5 respondents disagreed, 4 were uncertain, 9 agreed, and 2 strongly agreed whereas in case of PPP website 4 respondents strongly disagreed, 3 disagreed, 5 were uncertain, and 8 agreed as shown in Fig. 11.9.

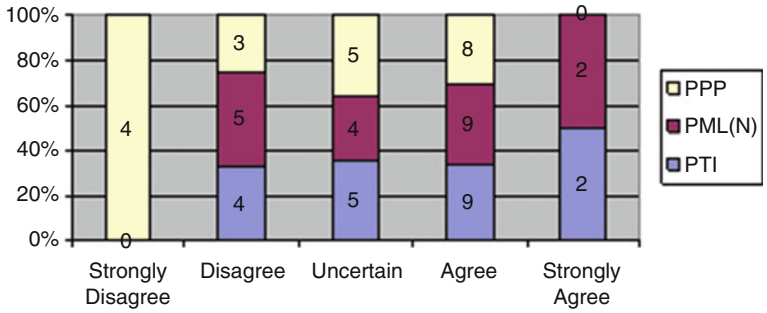


Fig. 11.9 Look and feel of website

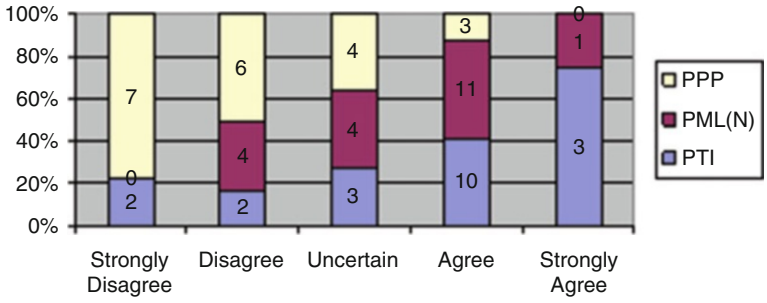


Fig. 11.10 Help and support features

If a website does not have a help and support option then it may be less usable for casual users. In our survey we found that for PTI website, 2 respondents strongly disagreed, 2 disagreed, 3 were uncertain, 10 agreed, and 3 strongly agreed that they have enough help and support features. For PML(N) 4 respondents disagreed, 4 were uncertian,11 agreed, and 1 strongly agreed. In case of PPP website 7 respondents strongly disagreed, 6 disagreed, 4 were uncertain, and 3 agreed as shown in Fig. 11.10.

User satisfaction is an important indicator to judge the usability success for any software system. If users are not satisfied it means that they are unable to complete required tasks with ease. In our survey we found that in case of PTI website, 2 users strongly disagreed, 3 disagreed, 2 were uncertain, and 13 agreed that they are satisfied by the website. For PML(N) website, 4 users disagreed, 4 were uncertain, 11 agreed, and 1 strongly agreed whereas for PPP website 7 respondents strongly disagreed, 5 disagreed, 5 were uncertain, and 3 agreed as shown in Fig. 11.11.

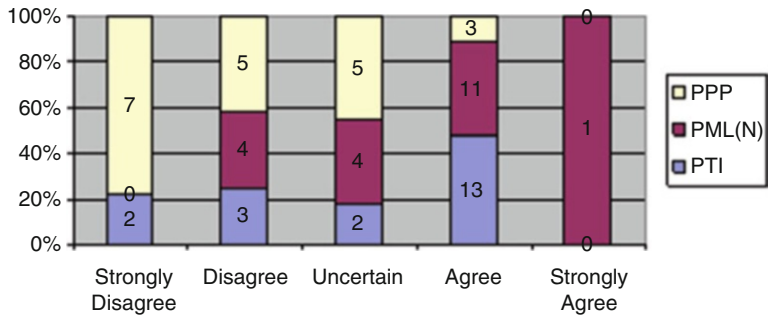


Fig. 11.11 User satisfaction

4 Conclusion

A survey of three political parties' websites in Pakistan showed fair results. All websites have clear features but with respect to usability level, some features are missed out. These are Help & support, Zoom options, Contact us, Content sharing & Users participation. In this survey different usability factors were discussed in detail with the help of feedback taken from the users. As usability is cultural dependent, political awareness, literacy rate, and internet access of users need to be considered to achieve maximum usability. Content should be regularly updated and language issue should be addressed on priority.

References

Aytuna, N., Karsak, B., & Albayrak, Y. E. (2008). A proposed model for the Turkish political parties website's efficiency: An integrated method using analytical hierarchy process. *International Journal of Information Technology and Business Management, 8*(1), 55–72.

Hassan, S., & Li, F. (2000). A framework for evaluating the usability of political web sites: Towards improving cyberdemocracy. *World Conference on Educational Multimedia, Hypermedia and Telecommunications* (Vol. 2000, No. 1, pp. –1665).

King, J. P. (2008). *Website usability on an international scale: A content analysis.* Master's Paper, University of North Carolina at Chapel Hill, North Carolina, USA.

Nielsen, J. (1994, April). Enhancing the explanatory power of usability heuristics. *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (pp. –158). New York: ACM.

Nielsen, J. (2003, August). Usability 101: Introduction to usability. Alertbox: Current issues in web usability. Retrieved from http://www.useit.com/alertbox/20030825.html

Saeed, S., & Amjad, A. (2013). Understanding usability issues of Pakistani university websites. *Life Science Journal, 10*(6s), 479–482.

Saeed, S., Jamshaid, I., & Sikander, S. (2012). Usability evaluation of hospital websites in Pakistan. *International Journal of Technology Diffusion, 3*(4), 29–35.

Saeed, S., Malik, I. A., & Wahab, F. (2013). Usability evaluation of Pakistani security agencies websites. *International Journal of E-Politics, 4*(3), 57–69.

Saeed, S., Rohde, M., & Wulf, V. (2008, April 9–12). ICTs, an alternative sphere for social movements in Pakistan: A research framework. *IADIS International Conference on E-Society*.

Shahizan, H., & Norshuhada, S. (2003). Assessing the usability of political web sites in Malaysia: A benchmarking approach. *Digital Libraries: Technology and Management of Indigenous Knowledge for Global Access* (pp. –479). Berlin, Germany: Springer.

Web Credible. (2010). Political party websites: Poor communication with users: a usability study of UK party websites. Retrieved from http://www.webcredible.co.uk/user-friendly-resources/white-papers/politics-usability.pdf

Youngblood, N. E., & Mackiewicz, J. (2012). A usability analysis of municipal government website home pages in Alabama. *Government Information Quarterly, 29*(4), 582–588.

Youngblood, N. E., & Youngblood, S. A. (2013). User experience and accessibility: An Analysis of county web portals. *Journal of Usability Studies, 9*(1), 25–41.

Chapter 12
Kenyan eParticipation Ecologies and the Rise of African Techno-Discourses: Methodological and Ethical Challenges in Understanding the Role of ICTs in Kenya

Vincenzo Cavallo

1 Background

> New ICT in Africa have become hugely popular with international donors, development partners, NGOs, opinion polls organisations and other business actors, and the frontiers of research and academia have become particularly porous. [Sharath Srinivasan (ECAS 2013 panel introduction)]

Many research projects on ICTs in Africa have been developed with or commissioned by organizations that have been previously involved in such projects. Sometimes these organizations are involved as donors only, while in other cases as implementing partners, and in few cases as both.

The Kenya Ushahidi Evaluation Project (Chan and Tully 2012), a 9-month Ushahidi evaluation research, is just an example of how these frontiers between no profit organizations, research and academia have become particularly porous.

In the case of Ushahidi Evaluation Project, the research was sponsored by one of the same organizations that previously funded Ushahidi team, the Knight Foundation and implemented by the Harvard Humanitarian Initiative (Program on Crisis Mapping & Early Warning) of which Patrick Meier, former Ushahidi Director of Crisis Mapping, was the co-founder and co-director.

In this specific case the approach to the study of Ushahidi impact was based on an ethnographic research made through interviews and focus groups. Therefore a series of questions have been asked to the same people who have taken part in such projects as volunteers, developers and administrators.

In the case of Uchaguzi, a monitoring election platform using Ushahidi, the conclusion of the research team is

V. Cavallo (✉)
Cultural Video Foundation, Nairobi, Kenya
e-mail: vincenzo@culturalvideo.org

S. Saeed (ed.), *User-Centric Technology Design for Nonprofit and Civic Engagements*, Public Administration and Information Technology 6, DOI 10.1007/978-3-319-05963-1_12,

> Conclusion
>
> Overall Uchaguzi-Kenya project was a success. The collective action of all those involved provided a communication channel for Kenyans to share information about the referendum. It also enabled some organizations to take immediate action based upon the information on the platform. The project was not without its challenges. This case study aims to help bring light to some of them and share the creative solutions of dedicated and passionate participants. But more importantly it aims to help future users learn from the past, to spark fruitful conversations among future Uchaguzi/Ushahidi/Crowdmap deployers and to help others plan future projects.

Questioning this conclusion is not the objective of this chapter, what is important for us is to underline the conflict of interests between researchers and funders in order to understand the possible process behind the raise of a techno-discourse. By defining the Uchaguzi project a success, the researchers are indirectly celebrating their funder ability to invest in this project rather than others. The suspicious is that a famous academic institution has been simply used to legitimize the success of a project rather than challenge it.

Using Castells's analytical framework (Castells 2009), we may define some of the actors involved in this process as "Switchers", actors that thanks to their position within different networks are able to become an interface between two or more networks of power, in this case the ICT4Development and the academic network.

These types of conflicts of interests can emerge anytime that a "Switcher" is trying to use its position within different networks to gain more power. In this specific case, the situation created a lot of concerns among a large number of academics that have been involved in these types of research projects, in particular among academics that have developed a critical approach and are trying to focus on innovation processes, power dynamics and social impacts, rather than technical functionalities.

From a content perspective, using the frame analytical framework (Snow and Benford 1988) this may also be considered as a "frame amplification". Frame amplification simply denotes "the clarification and invigoration of an interpretive frame that bears on a particular issue, problem or set of events". Frame amplification is used to maintain, legitimize, an already existing frame.

The production process behind cyber African techno-discourses seems to be characterized by this peculiar encounter between two very influential lobbies, the aid industry and the ICT ones. Events such as political elections or emergency situations are important opportunities for these lobbies. During such events, they can exercise their power to influence public opinion and policy makers.

In the case of the last Kenya elections, some concerns have been raised about the impact of such influences. The interesting thing is that such complains have been raised by some of the same people who are working in the field of ICT4Development and Democracy.

The 22nd of April 2013 on an ICT4Development blog, a post written by Anahi Ayala Iacucci, a Media NGO worker appeared and raised an interesting discussion. She was trying to demonstrate the dangerous impact that Ushahidi maps duplications could have had in case of a new emergency situation in Kenya, she mentioned Ughacuzi as well as part of the problem.

> DO WE REALLY NEED ALL OF THOSE PROJECTS??? Do we really need 3 maps, 7 phone numbers, and several web-forms? Is that really such a crazy bad idea to have one coordinated number/web-form that could then have in the back-end multiple responders and organizations working together?
>
> I mean, seriously, what the hell should a Kenyan do today when something happens? Send 7 SMSs and compile a bunch of web-forms for each event they see? They should all go around with a list of the specific topics that they should report on and which platform they go to?
>
> This would look like something like this: "If you are in Mathare send a report to 0726300400 and to 3002 and to 108, but only after you have alerted the police at 999 or 112. But if it is something related to human rights violations, and more in particular IDPs, then remember to also text 0800721410. If the issue is related to violations competency of the Independent Electoral and Boundaries Commission then you should text 0711035606/0711035616, but if you get a rumor via mobile phone you probably should send a text to 8762 just in case SiSi Ni Amani is also working in your area. Oh, and by the way, keep safe and keep reporting to us. If you still have any credit in your mobile phone or if by the time you send us a message you did not ended up being killed!" [Anahi Ayala (ICT Works blog post)]

On the first of May Erica Hagen, another media for development expert who has been involved in one of the Ushahidi projects criticized by Ayala Iacucci article answered

> I'm actually surprised there were only 7 numbers for the entire country. I have a lot to say about this topic, see my post today: "Citizen election reporting in Kenya: A failure of technology duplication, or a breakthrough in online-offline collaboration?"

Erica Hagen published another article on her blog trying to explain her own point of view

> … technology was part of the solution, not the problem, during Kenya's elections [Erica Hagen (personal blog post)]

These two positions are not necessarily part of two different techno-discourses who are in conflict between each other, however within the same techno-discourses different positions and opinions can still coexist. In this case Ayala Iacucci is raising a question related to duplication danger and waste of funds; however, she is indirectly raising another question also about legitimacy.

> So, let's be clear here: I am all for more transparency and for multiple channels of communication. Especially in emergencies, the more people are ready to respond, the better it is. Now, the problem is exactly this one: are all of these people really ready to respond? [Anahi Ayala (ICT Works blog post)]

On the other side, African leaders and political journalists have also raised some concerns on NGOs and International Organizations interests in supporting such projects to promote hidden agendas.

They have accused these international organizations of supporting human rights and democracy in order to interfere in their countries political affairs rather than for cooperation and humanitarian purposes. This may be the case of countries like Ethiopia that banned not only human rights organizations using media for advocacy, but also humanitarian organizations accusing them to support hidden agendas.

Other African leaders have fully embraced a specific cyber African techno-discourse and used it to attract western investment while at the same time they were oppressing democratic forms of political opposition. This may be the case of Rwanda.

In both cases, ICT projects, especially eDemocracy/eParticipation ones, are seen from these African politicians' perspectives as specific strategies to influence or consolidate power rather than neutral tools to improve citizens' life. For them eParticipation platforms are not neutral tools to be used in order to improve transparency and accountability; therefore, these technological implementations need to be rejected as part of an external threat or by the government.

In the case of Kenya, things are some how different, mainly because power dynamics are much more complex than in Ethiopia and Rwanda, consequently Kenyan techno-discourses may also appear more complex to analyse. In any case they seem to be very influential.

This is probably the reason why during the last election the Kenyan government through the Kenya's IEBC (Independent Electoral and Boundaries Commission) decided to develop and implement an ambitious technology plan to manage the whole electoral process.

The government considered that they had both the technological and organizational capacity to manage this process electronically, despite the huge problems that the country still faces in terms of infrastructures and administrative decentralization. Such self-evaluation may have been influenced by concepts such as the "leapfrogging" (Schumpeter 1942/1994) recently used in the context of developing countries as a theory of development which may accelerate development by skipping inferior, less efficient, more expensive or more polluting technologies and industries and move directly to more advanced ones.

Therefore, when this electoral management system crashed not only caused an enormous damage at national level, almost provoking a new tribal clash between the two main candidate supporters, it also raised new questions at international level on the real status and competence of the ICT sector in Kenya and the recently use of concepts such as the "leapfrogging" within the ICT4Development word.

This is what Erik Hersman, one of the Ushahidi and iHub funders wrote on his blog in March 2013.

> My assumption was that since this was a public service for the national elections, that the companies involved would be publicly known about as well. This wasn't true, it took a while asking around to get an idea of who did what. On top of that, In a country that has been expounding on open data and open information, I was surprised to find that most of the companies didn't want to be known, and that a number of people thought it was a bad idea to go looking for who they were and what they did. I wasn't aware that this information was supposed to be secret, in fact I assumed the opposite, that it would be freely announced and acknowledged which companies were doing what, and how the overall system was supposed to work.
>
> I've spoken directly to a number of people who are very happy that I'm asking questions and putting the facts I find in an open forum, and some that are equally upset about it. Much debate has been had openly on Skunkworks and Kictanet on it this, and when we debate ideas openly we fulfill the deepest promise of democracy. My position remains that this information should be publicly available, and the faster that it's made available, the more credible the IEBC and it's partners are.

In this blog post Erik Hersman is openly stating that he is very surprised about the fact that his own personal assumption on public services for national election has not been shared by the whole tech-community of Kenya. He mentions also the fact that a part of the tech-community shares his own vision while another is totally against it.

Finally this internationally recognized blogger concludes:

> My sense of the IEBC tech-shortcomings is that it had very little to do with the technology, or the companies creating the solution for them. It was a fairly simple technology solution, that had a decent amount of scale, plus many organizations that needed to integrate their portion of the solution. Instead, I think this is a great example of process management failure. The tendering process, project management and realistic timelines don't seem to have been well managed. The fact that the RFP due date for the RTS system was Jan 4, 2013 (2 months exactly before the elections) is a great example of this.
>
> Some are saying that the Kenyan tech-community failed. I disagree. The failure of the IEBC technology system does not condemn, nor qualify, Kenya ICT sector. Though this does give us an opportunity to discuss the gaps we have in the local market, specifically the way that public IT projects are managed and the need for proper testing.

There are several interesting elements that are emerging from this post. The first is that there is a conflict within the tech-community about the concept of democracy and transparency, a "discourse conflict". The second is that this event had a negative impact on the whole Kenyan ICT sector and the emerging discourse on African cyberdemocracy. Thirdly that Mr. Hersman is clearly giving the responsibility of this failure to the public administration process rather than both the "known and unknown" private companies that provided this service.

It is therefore clear that the processes through which all these different Kenyan techno-discourses emerged, developed, clashed and converged/aligned are very complex and are all deeply related to different power dynamics.

For this reason, it is very important to uncover such power dynamics in order to understand them, and I believe it is possible to do so, by analysing eParticipation from a totally different perspective.

Some academics working in the field of ICT4Development and Democracy, influenced also by the latest scepticism trends in the study of the so-called Information Society and its impact on the political and cultural sphere (Morozov 2011), have started to think that there is a strong need to refocus on ICT failures rather than success, in order to better understand how to avoid waste of development funds. This is probably the case for the above article by author Anahi Ayala.

Their attempt to re-establish a critical approach to the study of ICTs for Development is admirable, but even in this case their focus is still on functionalities and appropriation rather than power dynamics and more in general, social and organizational structures.

Despite the fact that a number of scholars have argued against technological determinism and for social constructionist views of ICTs (Zorn 2002), the meaning of failure or success within a specific socio-technological dynamic and political context has not been questioned yet by most of the ICT4Development and Democracy researchers.

Most of them are focusing on how implementation dynamics have or should have occurred in order to support a successful project process/outcome. There are several reasons why their perspective on ICT has not changed yet, in this chapter only three of them will be discussed.

Firstly, these approaches are all based on the assumption that ICTs are just tools.

Secondly, most of the recent developed frameworks used to study ICTs have been based on Indexes, but Indexes are normative tools rather than exploratory ones.

Thirdly, many conflicts of interests between researchers and their donors may have caused serious distortions in the way researches have been conducted their researches in this very specific field of ICTs for Development and Democracy.

Therefore most of these research projects are not properly designed, mainly because it's impossible to apply categories such as successes or failures to these projects without first uncovering the power dynamics behind them.

However such attempts to uncover duplications, waste of funds and legitimacy issues, should be considered as a step forward toward a critical approach to the study of ICT4Development and Democracy. These studies constitute a body of knowledge on which it is possible to build on a new analytical framework.

2 An Introduction to the eParticipation Ecology Framework and the Concept Idea Behind Techno-Discourses

The idea of creating an eParticipation ecology has been developed following the already existing communicative ecology concept (Tacchi et al. 2003) and the application of the latest studies on Game Theory (Camerer 2003).

The idea of considering an Index as an effective tool to be used to analyse and evaluate an eParticipation project should be reconsidered if not totally rejected.

Exploratory methods begin from the present, and see where events and trends might take us; normative methods begin from the future, asking what trends and events would take us there.

Therefore, in this chapter Indexes are considered as mere normative tools rather than research frameworks, they should be considered as effective tools to understand how to build a certain type of social structure and mechanism rather than understand what is happening within a certain context. Indexes are political tools used to drive a society in a specific direction.

The eParticipation ecology framework is an analytical tool that should help us to understand the present and try to predict the future.

This is why successes and failures are not considered universal categories that can be applied to the outcomes of a specific project. In this chapter both successes and failures are considered political, cultural and social constructs/discourses used to legitimize or delegitimize the action of a specific group of actors.

The main objective of the eParticipation ecology is to provide a tool to map these different actor trajectories rather than legitimize or delegitimize them. Actors'

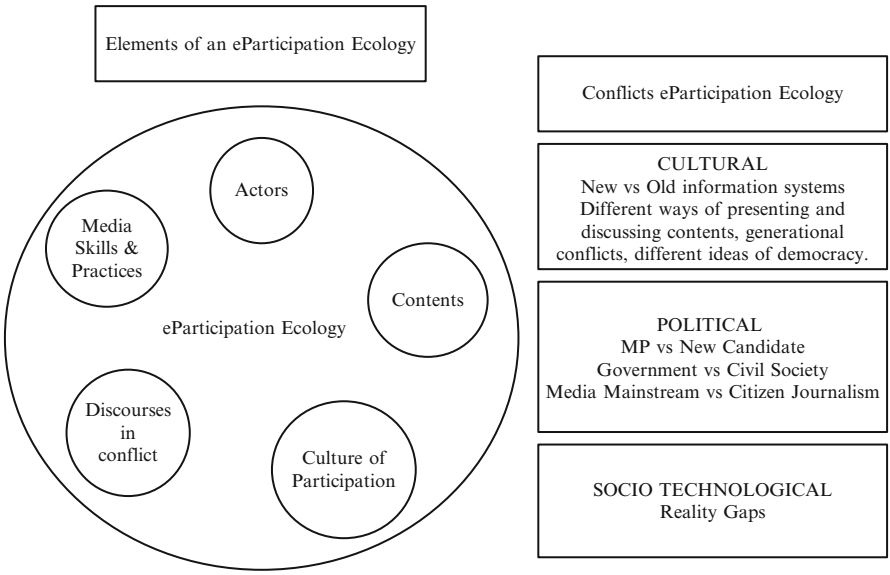


Fig. 12.1 eParticipation ecologies

ethical and ideological positions are studied as part of the influences that are creating these trajectories.

In an eParticipation ecology interactions between actors are seen as "games" in which different rational and irrational moves are taking place. A game consists of a set of players, a set of moves (or strategies) available to those players, and a specification of payoffs for each combination of strategies.

An eParticipation ecology is an analytical framework (see Fig. 12.1) to map a specific network and it's composed of five elements: actors, contents, traditional culture of participation, existing media skills and practices, discourses in conflicts (establishment vs. antagonists) and three macro-dimensions: cultural/traditional, political and socio-technological, in which the five elements are interacting between each other (Cavallo 2010). In these three dynamic dimensions, different actors interact with each other.

In this sense, the eParticipation ecology framework should be a useful analytical tool to think with or through technology rather than think about technology.

In the next paragraph, we will try to explain how to make use of it, in order to understand the process through which these different Kenyan techno-discourses emerged and developed, in order to understand the role of the different actors involved: journalists, experts, researchers, politicians, activists.

Techno-discourses are emerging from different actors who have different visions and different economical cultural and political interests. However, in the last years the visions and techno-discourses of these different groups in Kenya are converging. Using the frame analysis categories, we may also define this process as a frame alignment (Snow and Benford 1988). We are assisting to the raise of one dominant techno-discourse on Kenya as the new ICT innovation Hub of Africa.

This techno-discourse has been recently challenged by events such as the political problem caused by the e-Voting system adopted for the last Kenyan elections and the exponential duplication of Ushahidi platforms developed to monitor such elections. During this specific period, the mainstream media and the ICT4Development experts have questioned the way in which ICTs have been used by both the government and the civil society organizations.

Techno-discourses can be identified by using two approaches:

- Firstly, by analysing production processes, power dynamics and conflicts of interests between different actors/players, applying frameworks coming from the neo Marxist tradition such as the latest Manuel Castells's approach to the study of media (Castells 2009).
- Secondly, by analysing media contents using the latest frame analysis approaches developed by Jim A. Kuypers (Kuypers 2010, 2009).

Therefore we should consider techno-discourses as both, the result of an economical and cultural process that is happening within a specific Media Ecology (McLuhan 1964) and an agent of social change (Snow and Benford 1988) able to influence social movements and political participation. This is the main reason why we consider techno-discourses as important agent of socio-political and cultural change.

3 How the eParticipation Ecology Framework Should Work

The three main stages, origin, development and end, of any eParticipation project are influenced by power dynamics that can be classified in three main categories. Each one of these following categories has an influence on the project cycle, in a different way and at different levels.

The first, category should be able to influence the way social actors structure their knowledge on "eParticipation", "democracy", "participation" and "development".

It's about their system of beliefs; therefore, it is directly connected to their political agenda but it's not necessarily connected to their actions and practices.

This macro-analytical category should be used to investigate the genesis of different eParticipation ontologies used by different social actors and could be named "Discourse-Influences". The system of thoughts composed of ideas, attitudes, courses of action, beliefs and practices that systematically construct the subjects and the worlds (Foucault 1972).

Terms, categories and classifications developed or just used by different actors involved are the main object of investigation. These body of knowledge constitute their tools to access realities. This part of the analysis concerns mainly the study of ontologies.

For the scope of this chapter, it is therefore necessary to consider how power dynamics influence the way in which "Africa" has been studied by the so-called developed countries from which most of the funding for research projects originates. It is during this historical process that eParticipation ontologies originated.

For this reason, it is very important to consider, the influence of dominant western theories of development studies and technological innovation, such as the "modernization theory" model influenced by both the liberal and the Marxist school of economics, or more in specific, the ones created by "ICT for development" experts who did not question the "technological determinism" behind some of the dominant theoretical frameworks, such as the "creative destruction" (Schumpeter 1942/1994) that influenced most of the current analytical framework created to understand innovation in developing countries.

These theories are directly linked to "discourses" embedded in western societies and disseminated during international events such as the World Summit on Information Society (WSIS) or other international meetings organized by western-driven organizations.

Many concepts, values and ideas on which these discourses are based should be deconstructed to understand the "discourses influences" behind eParticipation projects in order to understand what is the real agenda consciously or unconsciously adopted by the different groups that decided to support a specific eParticipation project in Africa or in other developing areas.

History proved that the majority of these discourses have been functional for the ruling elites who produced and used them to expand their power by influencing local/national and international policies before and after colonialism.

However not all the actors involved in such dynamics are aware of which agenda they are pushing for; some of them are so deeply influenced by these discourses that are not even willing to discuss them; other actors are aware of these discourses and their hidden political agenda but are not willing to uncover such dynamics for different reasons related to their personal trajectories.

Both participatory methodologies and ICTs for development projects have been used, and are still used today, to serve specific political agendas.

This implies that a critical approach to study both participation as a way of managing resources and the use of ICTs within an informational system (Castells 1998) is needed in order to understand eParticipation—especially but not exclusively in the context of the so-called developing countries".

This critical approach should be applied to the analysis of eParticipation, not only to uncover these power dynamics, but also to develop a new set of alternative ontologies in order to counterbalance the most influential techno-discourses and dismantle "interpretative monopolies" (Turpel 1990).

A possible solution could be to use the approach proposed by Olivier de Sarden: a "socio-anthropologie du changement social" (an anthropology of social change), in order to overcome the dialectics between the development anthropologist and the anthropologist of development to create an anthropological approach capable of analysing and deconstructing external/oppressive "discourse influences" in order to develop new ones aimed at supporting the uprising of a non-dominant community.

This type of analysis should be done at the very first stage of any research in order to define the macro-trajectories of the different actors involved into the world of a specific eParticipation project. A possible solution would be to classify and map them according to the techno-discourses they believe in and belong to.

The second analytical category does not focus on cognitive activities such as the construction of ontologies in order to create techno-discourses; this category should be used to analyse the past and present behaviour of different group of actors, in order to understand which could be their future decisions. Therefore this analytical category can be used to understand how actors have been able to influence the way projects started, developed and ended.

This category can be named "Actors-influences".

An eParticipation project may be started as a result of a conflict between two or more actors. In other words, it may exist because a specific conflict occurred and one of the actors decided to use eParticipation as a tool to fight against the opponents.

An eParticipation project may end because the conflict from which it was generated has been solved.

In other cases eParticipation projects may be kept alive by citizens and civil society as an act of resistance.

An eParticipation project may also start because an international/national development agency decides to target ICTs and eGovernance as a field of technological assistance through which it is possible to influence a country's policy-making processes, as already mentioned in the introduction.

A social actor or a group of activists may use eParticipation to gain the attention of public opinion and influence civil society at international, national and local levels in order to gain power and authority to build political consensus or/and economic structures.

Whatever is the motivation of the actors involved they will influence the project in each one of the development stages; therefore, it is crucial to understand the real motivation of these actors. It is also important to understand what their real expectations are and what will happen once they meet them, or on the contrary, what will happen when frustration arises.

The third analytical category should be able to help us to understand the influence of semantic technologies on eParticipation projects that are dealing with legislative processes. This macro-category can be named "Techno-Semantic-Influence".

Technocrats behind semantic technologies, especially in the legislative field (the so-called legal semantic web), decide how different concepts and bodies of information are linked to each other, thus influencing the sense of an event and the relationships between different episodes of political relevance. As a result, technocrats are often able to influence the way legislative acts are discussed, approved or rejected. Episodes occurring outside legislative bodies but related to what happens inside them can be easily ignored or manipulated by omitting a link to specific information or by selecting certain types of information while ignoring others. These "techno-semantic-influences" may represent a threat to people who are interested in understanding the genesis and the possible impact of a legislative framework.

For example, a hypothetic minister that is proposing a certain law is in fact guilty of a related crime. However, if the law in question does go through, the crime of which he or she is guilty will no longer be considered a crime. By controlling the way a semantic "mark up" is applied, technocrats influenced by governments may

decide that the criminal record of a minister should not be linked to the laws he or she is proposing and discussing in parliament. In this way, it will become more difficult for journalists, civil society or other members of parliament to discover possible conflicts of interests or other factors that may negatively influence policy making. The importance of using open standards such as XML is directly linked to the right of social movements, journalists and members of parliament or other legislative bodies, to mark up in a participatory manner, important information in order to "democratize" the legislative semantic web. An example of this type of semantic "participatory mark ups" projects is the www.theyworkforyou.com website developed in the UK to monitor the legislative activities of MPs.

These three categories "Discourse Influence, Actor Influence and Techno Semantic Influence" are part of the eParticipation ecology framework (Fig. 12.1).

In the graphic below the eParticipation ecology elements are represented in circles and they include all the above mentioned categories such as the "Actors influences" within the Actors' circle, the "Discourse Influence" within the Discourse in Conflicts' circle and finally the "Techno Semantic influence" that can be potentially allocated inside any of the other remained circles (contents, culture of participation, media skills and practices).

These elements are interacting within three coexisting transverse dimensions: cultural/traditional, political and socio-technological.

These actors are not necessarily sharing the same physical spaces; however, their objective is to influence policy-making processes in specific geographic/administrative areas.

These actors are able to actively influence such policies being involved at local, national or international levels.

During the course of my field research in Kenya (Cavallo 2010), I analysed how these actors are also using social networks such as Facebook to debate about political issues. I discovered that young people living in Nairobi are actively involved in local debates concerning their constituencies of origin.

In the same way, the influence of Kenyans abroad through the use of social networks such as Facebook drastically increased during the 2007 elections and is becoming a new source of opinion, able to influence the decision of a considerable number of Kenyan voters.

The most evident example is Ory Okolloh, a human rights activist behind two of the most relevant eParticipation projects developed in Kenya Ushahidi and Mzalendo.

Okolloh studied and still lives abroad, despite being undoubtedly one of the most influential human rights/political activists in Kenya.

Therefore, eParticipation ecologies are borrowing the concept of field developed by the Network Ethnography (NE). Following this approach the meaning of "field sites" is adapted, and instead of choosing territorial field sites, the researcher has to choose a perceived community and select the important nodes in the social network as field sites.

Indeed, the field site may not be a socially significant physical place at all (Howards 2002).

For this reason, eParticipation ecologies are not only composed of specific geographic areas, in which policies are discussed and implemented, but also networks of actors, who do not necessarily live in these specific geographic areas, but that are able to use their networks to influence policy-making processes occurring in one or more geographic areas.

3.1 Designing Kenya Media Landscape by Using eParticipation Ecologies

The genesis of Ushahidi—in Swahili witness—can be explained by analysing the five elements of the eParticipation ecologies from which such project originated from (Discourses—Actors—Conflicts—Media Skills and Practices—Culture of Participation).

This open-source software was invented during the 2007 post-election violence. The Kenyan government (Discourse 1—Actor 1) decided to obscure live programs on TV and to limit media coverage of daily episodes of violence (Conflict Y—Media Skills and Practice 1—Culture of Participation 1).

Therefore, a human rights activist, Ory Okolloh; a blogger, Erik Hersman; and a developer, David Kobia (Discourse 2—Actor 2) managed over the course of 3 days, to develop a software that could be used to map in a participatory manner episodes of violence around the country. They created an eParticipation platform/project (Media Skills and Practice 2—Culture of Participation 2).

They achieved this by using existing software: Google Maps and FrontlineSMS, a software allowing to manage SMSs with the help of a simple laptop. The main objective of Actor 2 was to create a platform through which Kenyan citizens could inform each other about what was happening around the country. In this way, citizens who needed to move from one place to another for emergency reasons could be informed about road blocks and other dangers in order to avoid them. This system was providing a service but at the same time was questioning the current government policies and decision on how to manage the post-election violence emergency. The main objective of Actor 1 was to avoid any scene of ethnic violence or police repression on TV in order to calm down the local population and keep their internal affairs less visible as possible to the international public opinion.

Radios and mobile phones are the most accessible media in Africa; therefore, the online platform had to be developed according to the specific needs of Kenyan users. FrontlineSMS was synced to be used with Ushahidi. Once installed, the program enabled users to send and receive text messages with other groups of people through mobile phones while concurrently volunteers and bloggers were mapping information online using Google Maps. Consequently, other media such as CRs began using the Ushahidi platform as one of their main sources to inform citizens. In just a few days, Ushahidi, a newborn eParticipation platform, became a credible source of information for both citizens and mainstream media. The platform had

45,000 users in Kenya during this time of turbulence. Radio deejays read some of the reports on air.

In order to understand the genesis and the conflict between the two main techno-discourses behind Ushahidi genesis, we may use this type of analysis.

$$\text{Actor 1} + \text{Media Skills and Practice 1} + \text{Participation Culture} = \text{Techno Discourse 1}$$
$$\text{Actor 2} + \text{Media Skills and Practice 2} + \text{Participation Culture} = \text{Techno Discourse 2}$$
$$\text{Techno Discourse 1 VS. Techno Discourse 2} = \text{Result of the Conflict}$$

In this case, Ushahidi techno-discourse won, also thanks to the support of different experts and opinion leaders. Almost immediately an academic study of the Harvard Humanitarian Initiative, done by Patrick Meier (Meier and Brodock 2008), concluded that Ushahidi was better at reporting incidents as they started (rather than just the deaths resulting from incidents) and reports covered a broader geographical area than those coming from mainstream media.

Again, the point is not questioning such result, but pointing at the conflict of interests related to it, and the enormous impact that these academic researches have had and are having on other academics, but most importantly on other organizations that are capable of financing such projects.

The discourse influence in this case has been generated and disseminated by the same actors who have started the project. In this way they reinforced their system of belief and their approach to eParticipation; furthermore, they were able to gain respect and authority at national and international level. No matter what their real intention was at the beginning, this group of people, of which Patrick Meier was/is part off, was able to gain power through this action by coordinating and influencing the work of different opinion leaders, among them the academics who did not question the researches already mentioned in this chapter, their assumptions and methodologies until now.

Ushahidi was not only a technological innovation, but it became a new socio-cultural construct with its own political implication, the genesis of a specific techno-discourse.

Thanks mainly to these power dynamics and this capacity of the people behind Ushahidi of influencing the international and national public opinion at different levels, Ushahidi became probably the first and most famous African technological innovation of the world history.

Soon after its initial use in Kenya, the Ushahidi software was used to create a similar site to track anti-immigrant violence in South Africa, to map violence in eastern Congo, to track pharmacy stockouts in Malawi, Uganda and Zambia, to monitor elections in Mexico and India, to collect eyewitness reports during the 2008–2009 Gaza War by Al Jazeera, to develop a crisis information system in support of aid workers during the earthquake in Haiti and Chile, to map blocked roads and other information in USA by the Washington Post during the wake of winter storms and to set up a “map of help” for voluntary workers needed after a wildfire in Russia. This software allowed pro-democracy demonstrators across the Middle

East to organize and communicate what was happening around them in early 2011. It has been used also in Italy, Japan, Australia and in the Balkans.

The new discourse influence that emerged from this experience was linked to the idea that an innovation coming from the "South" of the world is now used to solve problems in the "North", that Kenya was the cradle of African cyberdemocracy. Such discourse became later functional for specific groups who wanted and still want to attract new investments in Africa; therefore, they are not directly interested in promoting the idea that the "North–south" power dynamics is radically changing, but such "discourse" may serve its own purpose.

According to the frame analysis approach, we may define this type of process as a frame bridge. This type of frame alignment constitutes the "linkage of two or more ideologically congruent, but structurally unconnected frames". Media activism and ICT as economic sector are merged into a single techno-discourse "Kenya as ICT hub of Africa".

There are two elements that are coexisting in this discourse, one is merely technological and is related to the dimension of technological innovation in Africa and the other is mainly political and is related to the dimension of democracy and participation. The relations between these two elements is vey important in order to understand, how and if this "techno-discourse" is really part of a wider political and economical change.

In order to understand more about this process, it is important to understand who are the people behind Ushahidi and what is their relationship with the so called "creative class" (Florida 2005), made by both, technical skilled and politically active actors, and finally, how did they meet and started this project.

The three main actors behind this eParticipation innovation are David Kobia, a Kenyan professional software developer, who studied and lived in the USA; Erik Hersman, already introduced in the previous chapter, a US citizen who was born in Sudan and partially raised in Kenya with a B.S. in Business Management; and Ory Okolloh, a lawyer and human rights activist.

Ory Okolloh was the person who started Mzalendo in 2005, an eParticipation project that already contained most of the "eParticipation ecologies elements" that will subsequently become the core part of the Ushahidi idea. Furthermore the eParticipation ecology in which Mzalendo emerged had also some important similarities in terms of conflict dynamics (cultural—political—socio-technological).

The slogan of Mzalendo is "keep an eye on the Kenyan Parliament" (Discourse 1), and this came about after the website for Kenya's parliament was shut down (Conflict) following protests by some MPs (Actor 2) who were embarrassed about their CVs being published online (Discourse 2).

The initial goal of Mzalendo, then, was to provide the basic information that otherwise would have been available on the official parliamentary website.

Kenya's parliament website is now back online—and much improved since its former 2005 incarnation—but the activists behind this eParticipation project continue to feel that they still have an important role to play in using online tools to hold Kenyan MPs more accountable.

Therefore the Mzalendo project is still going on following the model of the British "TheyWorkForYou" project.

If we look at this event from a different perspective, keeping also in mind the "assumptions" stated by Erick Hersman in his blog post, this could also be seen as an act of African "discourse appropriation" on democracy, technology and development performed by the emerging African and African-based "creative class" (Florida 2005), a process strongly supported by a group of western actors that are interested in pushing this appropriation process in a certain direction.

The eParticipation project Mzalendo, ("patriot" in Swahili), just like any other eParticipation project can be analysed in terms of "Discourses—Actors—Culture of Participation—Media Skills and Practices—Contents" and the conflicts that these elements are generating between different rational and irrational players. The model based on the eParticipation ecologies framework can be very useful to trace the discourses, the conflicts and the actors behind eParticipation projects and ideas.

The Kenyan eParticipation ecology, for instance, is strongly influenced by all the actors mentioned above. They support antagonist discourses that are generating conflicts, themselves generating eParticipation projects.

Kenyan politicians believe that the media should not be totally free to report about sensitive issues, especially during internal crisis, such as tribal clashes, but also that MPs' CVs should not be public.

Kenyan human rights activists believe that crowd-sourcing can be a strategic resource to face all types of emergencies and that the Kenyan Parliament, like the British one, should provide citizens open access to all types of data.

Different values, interests and ideologies are embedded in both discourses; this is the reason why both actors involved in this conflict will try to generate as much information as possible to legitimize their different actions.

Mazlendo generated and raised a political discourse among opinion leaders rather than a technological discourse. The main issue was the value of transparency within democracy; nobody was even questioning the fact that ICTs should have been a driven force behind development in Africa.

In the specific case of Kenya, the general idea that ICTs would have improved the quality of life of the common citizens has also been reinforced and turned into an assumption by the conjunction of different factors.

One of these factors may have been the economical success that the service M-Pesa obtained at national level, in the same period of time.

The eParticipation ecology framework can also be used to analyse the genesis of these types of technological innovations that are not directly linked to the political sphere but may have had an important impact on it, as both, techno-discourses and appropriation practices.

M-Pesa ("M" for mobile, "Pesa" Swahili slang-word for money) is the product name of a mobile phone-based money transfer service for Safaricom, which is a Vodafone affiliate. Therefore it is the result of a partnership between different organizations that represent a significant example of how mobile low-cost technologies can be used in creative ways to improve the life conditions of the populations of developing countries.

This innovation started as a "development project" (Discourse 1) financed by the Vodafone Foundation and the UK-based Department for International Development

(DFID) (Actor 1) trying to solve a problem that most Kenyans (Actor 2) have to face: credit.

The initial concept of M-Pesa was to create a service that allowed micro-finance borrowers to conveniently receive and repay loans using the network of Safaricom airtime resellers. This would enable micro-finance institutions (MFIs) to offer more competitive loan rates to their users, as there is a reduced cost of dealing in cash.

The users of the service would gain by being able to track their finances more easily (Discourse 1 made by Actor 1 having a specific objective). However when the service was eventually set up for user trials, it was discovered that customers adopted the service for a variety of alternative uses (Discourse 2 made by Actor 2 having a specific need). This was seen from both sides as part of a series of complications between the donor, the partner and the implementation process (Conflict caused by different discourse objectives needs practices).

M-Pesa was refocused and launched with a different value proposition: sending remittances home across the country and making payments. This conflict of interests between the vision of Actor 1 and Actor 2 generated a new "media practice" from which both Actors (1 and 2) could benefit from, while Faulu decided to leave when the project lost the micro-finance component (this actor has a very specific mandate, therefore cannot work within another framework and therefore has to leave the project).

M-Pesa is now a branchless banking service, meaning that it is designed to enable users to complete basic banking transactions without the need to visit a bank branch. The continuing success of M-Pesa in Kenya is due to the creation of a highly popular, affordable payment service with only limited involvement of a bank.

The system was developed and run by Sagentia (UK-based company) from initial development to the six million customer mark. The service has now been transitioned to be operationally run by IBM Global Services on behalf of Vodafone (UK- based company).

The initial three markets (Kenya, Tanzania and Afghanistan) are hosted between Rackspace and Vodafone.

In conclusion what began as a "development project", partially financed by international aid public funds and implemented by a "western private company", thanks to the conflict between the initial objectives and the users' needs and consequently the users' "re-appropriation" of the mobile media practice, was transformed/redesigned into one of the most profitable business ever invented for the African market, considering that by 2012 mobile financial systems in developing countries created a market of about five million US dollars (CGAP and GSMA, 2009).

The appropriation is an ongoing transformation of use continuously brought about by interactions with other users and by interactivity with equipment and software.

Appropriation is a concept that helps us get out of a naïve prediction, built exclusively on technical possibilities. To think in terms of appropriation necessarily entails introducing social representations/perceptions of the potential users in their contexts/networks (Flichy 1995). In other words, appropriation happens within specific eParticipation ecologies in which power dynamics is able to generate

techno-discourses that may in some cases alter the pre-existing power relations between the actors who are interacting within these eParticipation ecologies.

Therefore the appropriation process that caused the rise and success of the M-Pesa case in Kenya may continue and provoke other changes also. For example in the political context, systems such as M-Pesa are changing the ways political fundraising campaigns are organized by candidates running for presidential and local elections.

It is also important to underline the complexity of the process to deconstruct the techno-discourse that this is an African innovation; in reality this innovation, just like Ushahidi, is the result of a process that cannot be narrowed to Africa, as already explained above.

However, despite the fact that this was not entirely an African innovation and that M-Pesa did not have a direct implication/influence on the political and democratic sphere, its success contributed to portrait Kenya as the new ICT hub of East Africa and consequently reinforced the techno-discourse about African cyberdemocracies especially among a certain group of actors, mainly media activists and people working in the development sector.

However, the recent events connected to the latest Kenyan National 2013 elections discredited such techno-discourses and the group of people behind them.

On the other side, before these 2013 elections, M-Pesa may also have contributed to shift the focus of the general public opinion from the political implication of technology to the economical implication of it, influencing the long-term strategies of the groups working in the ICTs for Democracy sector.

For example, after some years Ory Okolloh decided to leave the Ushahidi team to continue her activity as a lawyer and human rights activist, while Ushahidi became a company and turned its success into a long-term project, the iHub, with a much broader and business-oriented vision.

The iHub vision is to transform Kenya into the main technological HUB of Africa and the relation between this objective and the development of a transparent democratic model is not direct anymore, as mentioned also by the same funder Erick Hersman.

At a certain stage both groups of actors, the people behind Ushahidi and the people in the government were able to use the new Kenyan techno-discourse in order to develop new trajectories/strategies that converged in their new common purposes, to make Kenya a technological hub.

Because their trajectories and interests started to converge, the conflict dimension became less predominant; this convergence had an important impact on the future decisions that were made by both actors and the emerging of other forms of political activism and antagonist actors within the Kenyan eParticipation ecology.

For example, the latest technological innovation from the Ushahidi team is not another "watch dog" application, it's a hardware that provides Internet connection everywhere where there is a possibility to access a mobile phone network; this innovation is basically a backup generator for the Internet named BRCK.

In the iHub other applications for mobile phones have also been developed and defined as M-Governance applications; the idea behind these new applications is

mainly to provide information to improve public services such as water for example, rather than challenge the government on issues such as transparency and open data.

The iHub became not only a place where technologies are produced, thanks to the support of profit and non-profit-oriented organizations/investors, private and public funds, it's also a place where researches are developed and disseminated in order to legitimize, or in same case delegitimize tech-innovations. There is a specific department named the iHub Research created to interpret and evaluate ICT trends and the same projects that are coming out of the iHub.

That same strategic model that made Ushahidi an international case, thanks also to the work of academics, has been applied again to the iHub project on a different scale and with different purposes.

3.2 Cultural and Socio-Psychological Dimensions of an eParticipation Ecology Framework

One of the elements that form part of an eParticipation ecology is the "Culture of Participation". This element is able to influence both social practices and perceptions; in other words, techno-discourses are deeply related to these two spheres.

Within this element, the cultural and the socio-psychological dimension coexist and they both influence the way technologies are appropriate and used to influence decision making.

For example in the case of Kenya, there are several traditional forms of political participation that deserve to be studied in order to understand the current practices and draw possible future scenarios. These forms of participation are very important to understand the current situation and the media practices.

The future scenarios that could be drawn starting from the study of such practices may be used not only to understand the possible future implications of certain technological appropriations but also to develop new eParticipation projects that can really fit into the context and serve a specific group of actors.

At the same time, it is also interesting and very useful to understand the socio-psychological implication of certain eParticipation practices, especially if such practices are related to a collective emotional moment like an election or a political crisis.

Different social actors have developed during the course of the years and centuries different "cultures of participation"; these differences are determined by their political history, their traditional practices and their socio-psychological way of managing collective emotions such as anxiety, fear, anger and happiness.

Both these two dimensions have a very strong impact on how electronic forms of political activism develop in a certain context.

3.2.1 The Traditional and Cultural Dimension of an eParticipation Ecology

There are different possible approaches to the study of this dimension. One of the possible approaches is to develop an ethnographic research in order to understand how politicians and citizens usually communicate with each other, and what their perceptions are about the effectiveness of these different communication channels.

The results should give us a clear picture of how the culture of participation developed in a certain culture and what should be the possible future scenarios.

The following field research was developed between 2008 and 2009 (Cavallo 2010).

The field research consisted of 16 interviews with personal assistants (PAs) of Kenyan members of parliament (MPs), eight constituency officers (COs) and two community radio journalists (CRJs).

The main research focus areas were:

- The use of different media to communicate between (PAs, MPs, COs and CRJs) citizens, civil society and journalists.
- The use of the media mix: new and old media, strategies and tools to inform and engage citizens in public debates.
- Perceptions and prioritization of different technologies usage and finally socio-technological ideas and scenarios for the future.

The main results of this research are summarized as follow:

Traditional forums such as mabaraza can constitute the main source of information to understand citizens' problems and opinions about political issues.

The baraza (pl. mabaraza) is a feature of Zanzibar's "public sphere". In organizational terms, a baraza may represent different degrees of formality and informality, institutionalization and abstractness.

A baraza might be a simple (informal) "meeting" of people, but it could also be a "council", or in historical times, the "audience" of the Sultan of Zanzibar. Finally, it could refer to a vast range of clubs, unions or associations. In spatial terms, a Baraza is a public or semi-public space where people meet to chat, communicate, quarrel, sit, similar to a "Piazza" in Italy "Agorà" in Greece or the "Majlis" in Arabia (Loimeier 2005).

The "baraza" appears to be at the same time: a place, an event and a forum; therefore, it is "an essential node in the social network" (Cavallo 2009, p. 9).

On 16 PAs interviewed 13 define baraza as the most used way to communicate with the citizens, furthermore in the perception of most of the PAs and COs baraza is also the most effective way of communication with the constituents.

From a transcription of the interviews:

> Our policies? We use a lot of ways to communicate. The most effective is a baraza. We also have printouts of vision… (Wajir East Constituency).

Usage/Media mix: mobile phones and community radios are used to organize mabaraza and communicate their contents to a vast audience; the Internet is used to send information from Nairobi to the constituencies, once in the constituencies they are distributed in different formats: radio and print.

Radios and mobile phones are mostly used to mobilize people while the Internet is seen mostly as a fundraising and a business-to-business tool rather than a media to communicate directly with citizens by most of the constituency officers.

From a transcription of the interviews:

> We have a representative per village, so this representative has a mobile phone, so when the MP wants to communicate with them he calls the representatives, they organize the meeting, then they speak… we also use posters then we put it in the markets and churches (Rarieda Constituency).

> We also have this public address system mounted on vehicles, so we prefer announcing our meetings… We also have Musii FM which we also use to communicate our meetings. (Kibwezi Constituency).

> For projects that we are trying to start, we take photos then we put them in those newsletters, is about projects that have not been completed by the former MP, so after we evaluate the situation then we send the information. The objectives of the newsletter is to inform the constituents about projects we intend to initiate and we urge them to prioritize every village should prioritize which projects are fundamental, the newsletter is sent from Nairobi to the constituency office by email, then they photo copy it and they distribute an hard copy version of it in local churches, schools and different public spaces. (Kitutu Chache Constituency).

Already existing data: radios have an enormous amount of information about citizens' opinions and polls in their online database; constituency staff members are video recording mabaraza and store the videos off-line.

Based on these findings, the recommendations for implementing an eParticipation project in Kenya should be the following ones:

- Inform citizens about incoming mabaraza, using mobile phones and radios.
- Record mabaraza contents using video and audio.
- Distribute contents and generate debates using radio browsing.
- Get feedback from citizens using mobile phones and store it online to record and keep track of citizens' opinions using relational database systems.
- Connect different radio databases between each others to have a clear picture of citizens' opinions and their trends at local and national levels.
- MPs should allow their staff to upload all the contents about mabaraza online so that radio stations, TV and single citizens could have access to them. Policy makers should use the data gathered to understand priorities and needs of the citizens.

However these recommendations don't have any scientific relevance if not properly contextualized within an eParticipation ecology.

Decision-making processes are not based on rational thinking; power dynamics and socio-psychological factors are decisive driven forces behind innovations (Ted Zorn 2002).

3.2.2 The Socio-Psychological Dimension of an eParticipation Ecology

Crowd-sourcing platforms such as Ushahidi are also able to respond to a collective psychological need by giving citizens a chance to overcome their sense of

impotence by actively engaging in an event of social and political relevance and at the same time being able to disclose and share the realities ignored by mainstream media. This is probably why these technologies have been used so much and in so many different places of the world.

It is the first step to overcome a psychosocial sense of impotence against the establishment power. Users can share information and connect places by mapping them, creating in this way a cognitive map of the problems that is able to delegitimize the mainstream media version of reality.

In this sense Ushahidi maps can be defined as Heterotopia, a concept elaborated to describe places and spaces that function in non-hegemonic conditions. A parallel space that contains undesirable bodies to make a real utopian space possible.

Ushahidi's capacity of generating this techno-discourse about African cyberdemocracy and the power of crowd-sourcing is also related to this new possibility to respond to this socio-psychological need and the fact that this sense of impotence and fatalism is very strong in Africa probably is not a coincidence.

This techno-discourse can also be seen as the main African contribution to the development of a new idea of political activism based on the capacity of independent users of reprogramming networks and generate data in a collective manner.

Two concepts, the "multitude" formulated by Hardt and Negri (2004) and the "informational society" further developed by Manuel Castells in "Communication and Power" (2009), fit into this techno-antagonist actor discourse.

The "informational-multitude" may therefore represent the emerging techno-discourse that will be able to influence the next generation of media activists living in both the developed and the developing countries.

Groups of users, producers, bloggers, human rights activists and common citizens may start to consider themselves as a whole of singularities, always productive and always in motion.

Participatory social mapping for these actors may start to represent a sort of constitutional process "momentum" through which the "informational-multitude" appears/manifest itself like a sort of techno-spirit, to disclose and publicly display problems in order to discredit the mainstream media. A new cyber ritual that can be performed by different actors during a crisis such as the already mentioned post-election violence in Kenya.

Other examples such as the participatory social mapping events in occasion of the 2010 Kenya constitutional referendum and the 2013 elections, during which hundreds of Ushahidi volunteers physically met to map data, may demonstrate the emerging of these new socio-techno-rituals.

However to assume that these techno-rituals are the result of a conflict may be very wrong also, because they may also turn into socio-psychological strategies to reduce tension rather than form part of a serious antagonist movement agenda, especially if the interests of the tech-communities behind these projects and the governments start to converge.

Ushahidi has been used to map spaces in which negative episodes/events occurred, in order to destroy utopias and impose heterotopias using an online/offline mobilization. At the same time, Ushahidi has been used to display utopian

spaces by mapping areas in which positive episodes/events have occurred, in order to balance a negative image created by mainstream media.

In conclusion, mapping is directly connected to the need of social movements and group of individuals to counterbalance both heterotopias and utopias, a collective act that may be used to reduce or to increase a political conflict.

4 Conclusion

In this brief chapter, the eParticipation ecology framework has been used to analyse different cases and to demonstrate how different projects were generated and developed from/around specific conflicts and convergences.

These conflicts and convergences influenced by these different actors' discourses (Foucault 1972), power dynamics, traditional practices and socio-psychological processes.

Even in the case of M-Pesa, that should not be considered as an eParticipation project, analytical frameworks such as the eParticipation ecology and the frame analysis can be useful to understand why and how a tech-innovation emerged from a specific context, contributed to reinforce specific techno-discourses, and finally can be "appropriate" by users to be implemented in totally different sectors.

The Kenya-techno discourse on "Africa Cyberdemocracy" has been challenged and discredited by the latest 2013 elections monitoring system failure and its impact on the political situation. This may have contributed to shift the focus from the democracy to the economical development dimension of ICTs and their potential impact on the future of Africa.

Finally by applying an exploratory approach such as the eParticipation ecology, rather than a normative approach based on an Index, it should be possible to analyse and understand the present dynamics and in some cases also be able to predict future scenarios about the impact of ICT projects on political cultural and economical contexts.

In this sense, the eParticipation ecology framework should be a useful analytical tool to think with or through technology rather than think about technology.

But in order to do so, we need to uncover power dynamics and conflicts of interests such as the ones described in this chapter, furthermore we need to abandon normative approaches to the study of techno-realities.

Donors, who have to choose among different projects/actors, what/who to support and why, could use this eParticipation ecology framework approach in order to ensure that their funds will be spent to support actions in line with their political and cultural values/visions.

Whatever is the case, and the possible application of this model, the main idea of this chapter is to demonstrate why there is a real need to shift the current research approach to the study of ICTs for Democracy and Development in Africa and how such shift may occur.

References

Authored Books

Camerer, C. F. (2003). *Behavioral game theory*. Princeton, NJ: Princeton University Press.
Castells, M. (1998). *End of millennium, the Information Age: Economy, society and culture* (Vol. III). Cambridge, MA: Blackwell.
Castells, M. (2009). *Communication and power*. Oxford, NY: Oxford University Press.
Flichy, P. (1995). *Dynamics of modern communication: The shaping and impact of new communication technologies*. London: Sage Publications.
Florida, R. (2005). *The flight of the creative class: The new global competition for talent* (1st ed.). Toronto, Ontario, Canada: Harper Business.
Foucault, M. (1972). *The archaeology of knowledge*. London: Tavistock Publications.
Hardt, M., & Negri, A. (2004). *Multitude: War and democracy in the age of the empire*. New York: The Penguin Press.
Kuypers, J. A. (2009). *Rhetorical criticism: Perspectives in action*. Lanham, MD: Lexington Press.
Kuypers, J. A. (2010). Framing analysis from a rhetorical perspective. In P. D'Angelo & J. A. Kuypers (Eds.), *Doing news framing analysis*. New York: Routledge.
McLuhan, M. (1964). *Understanding media: The extensions of man* (1st ed.). New York: McGraw Hill.
Meier, P., & Brodock, K. (2008). *Crisis mapping Kenya's election violence: Comparing mainstream news, citizen journalism and Ushahidi*. Boston: Harvard Humanitarian Initiative, HHI, Harvard University.
Morozov, E. (2011). *The net delusion*. New York: Public Affairs.
Schumpeter, J. A. (1942/1994). *Capitalism, socialism and democracy*. London: Routledge. p. 139. ISBN 978-0-415-10762-4. Retrieved November 23, 2011.
Snow, D. A., & Benford, R. D. (1988). Ideology, frame resonance, and participant mobilization. *International Social Movement Research, 1*, 197–217.
Tacchi, J., Slater, D., & Hearn, G. (2003). *Ethnographic action research: A user's handbook*. New Delhi, India: UNESCO.

Journal Articles

Howards, P. (2002). *Network ethnography and the hypermedia organization: New media, new organizations, new methods*. London: Sage Publications.
Loimeier, R. (2005, Autumn). The baraza: A grassroots institution. *International SIM Review for the Study of Islam in the Modern World, 16*, 26–27.
Turpel, M. E. (1990). Aboriginal peoples and the Canadian charter: Interpretive monopolies, cultural differences. *Canadian Human Rights Yearbook, 3*(1989–1990), 4–45.

Unpublished Doctoral Dissertation or Master's Theseis

Cavallo, V. (2010). *eParticipation and the theory of games*. Unpublished doctoral dissertation, IULM University, Milan.

Paper Presented at

Cavallo, V. (2009, May 6). *The Win Win eParticipation model*. Paper presented at the IST Africa Kampala Uganda.

Zorn, T. (2002, July 10–12). *Politics, emotion, and the discourse of ICT adoption and implementation*. Paper presented to the Annual Meeting of the Australia-New Zealand Communication Association, Gold Coast, Australia.

Websites

Chan, J., Tully, M. (2012). Uchaguzi evaluation. http://www.slideshare.net/Ushahidi/kenyaushahidi-evaluation-uchaguzi