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Principles of Management: Successfully Implementing Health IT

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Learning Objectives

This chapter will present key management principles for implementing Health IT derived from the experience of health IT Implementation in Israel and Scotland. After reading this chapter, readers will be able to:

- Identify and list key management principles and critical success factors for implementing health IT.
- Give examples of how these management principles have been successfully implemented in Israel and Scotland.
- Compare the implementation processes in Scotland and Israel—similarities and differences.
- Describe key tools and processes that contributed to the successful implementation of Health IT in both Israel and Scotland.
- Explain the broader context, both historically and in current practice in Europe and the USA, for the Israeli and Scottish experiences.
- Distinguish between the various terms used in the field, specifically, between health IT, eHealth, and digital health and between telehealth, telecare, and telemedicine.

Key Terms

- Health IT
- eHealth
- Tele-care
- Tele-medicine
- Implementation
- Leadership
- Management Principles

Introduction

In 2004, the European Commission issued a Communication to the European Parliament on e-Health that stated that "e-Health can help to deliver better care for less money within citizen-centered health delivery systems. It thus responds to the major challenges that the health sector—which employs 9% of Europe's workforce—is currently facing" [1]. This was echoed by Dr. David Blumenthal in 2010, then director of the US National Coordinator for Health Information Technology who wrote that: "Health information technology (IT) has the potential to improve the health of individuals and the performance of providers, yielding improved quality, cost savings, and greater engagement by patients in their own

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health care." [2]. Despite considerable financial investment by both the EU and the USA, implementation of Health IT has proved to be challenging. Clayton Hamilton, Technical Officer, Digitalization of Health Systems, Division of Health Systems and Public Health, World Health Organization (WHO) Regional Office for Europe, noted that: "While a handful of countries in Europe have made significant progress in reorienting their health systems to capitalize upon the advantages which digital health and high-quality data can offer, the reality of the situation across the majority of European countries is a starkly different one. Health systems are still often fraught with piecemeal technology implementations…" [3]. In the USA, there is still uneven implementation of health IT by doctors and hospitals. A major challenge in the United States has been the lack of interoperability among health IT systems that has impeded sharing and exchange of health care data among professionals and among healthcare providers [4].

The objective of this chapter is to share the management principles for implementing Health Information Technology (HIT) that derive from first-hand experience in implementing Health IT in Israel and in Scotland. Both Israel and Scotland have been, and continue to be, leaders in what we now call "digital health," but each approaches it from different vectors due to the differences in context and local challenges. This chapter will also provide some broad historical background on the evolution of Health IT—both in Europe and in the USA—as a context for the Israeli and Scottish journeys in great part because it actually influenced their experiences and decisions.

Case Studies in Brief

Israel

Israel is considered a pioneer in Health IT implementation, having begun its Health IT implementation in the mid-1980s. It is a successful example of a grass-roots bottom-up implementation approach. Israel has a National Health Insurance System, with four competing nationwide HMOs (Health Insurers who are also providers) responsible for providing the public basket of services to over nine million citizens. In its initial stages, Health IT in Israel was HMO-driven, resulting in the implementation of comprehensive, shared organization-wide Electronic Medical Records in all HMOs by the mid-1990s, followed by one of the first nationwide teleradiology systems in 1997, and patient portals in the early 2000s, enabling citizens online access to their medical information. While initiatives at the HMO and hospital level continue to be drivers for innovation in digital health, during the past decade, the Ministry of Health has assumed increasing leadership, including the development and implementation of a National EHR exchange and the articulation of a national strategy for digital health. Maccabi Healthcare Services, Israel's second largest HMO, was the first to institute an organization-wide EMR and exemplifies the critical management principles necessary to successfully implement Health IT at the organizational level. The critical success factors in the Maccabi Health IT implementation included:

- ongoing innovative and visionary leadership at the helm of the organization,
- commitment of organizational resources,
- establishing and empowering a multidisciplinary inter-departmental working team,
- joint strategic decision-making and co-design with the physicians—who were and remain key stakeholders,
- focusing on practical, tangible, and concrete needs,
- providing incentives,
- providing training and support to clinicians and staff, and
- ongoing collaboration among all of the stakeholders and users, both internal and external, including citizens/members.

At both the organizational and national level, competition has been a major motivator for innovation. The HMOs and hospitals in Israel compete to be the best and the most progressive, with the most advanced digital services for citizens and professionals. Nowhere has this been more evident than in the response of the HMOs and hospitals to the COVID-19 pandemic,

resulting in exponential advances in remote care, telemonitoring, and accelerated engagement in digital health for both professionals and patients.

Scotland

From the early 2000s onwards, the implementation of Health IT in Scotland has been grounded in supportive health policy and strategy frameworks. The strategic approach has placed technology at the heart of the quality agenda and provided waves of financial support for IT developments which drive service modernization and (more recently) the integration of health and care.

The National Health Service in Scotland provides healthcare to a population of 5.4 million citizens via 14 geographic (regional) Health Boards, 7 National Health Boards, and 1 Public Health body. The Scottish Parliament and Scottish Government were established in 1999 by an Act of the UK Parliament. Under this Act (Scotland Act 1998), a range of powers, including health and social services, were devolved to Scotland.

Subsequent Scottish eHealth/digital health and care strategies have evidenced a gradual shift away from health IT objectives which focus only on health organizations, towards support for strong citizen engagement and multi-stakeholder leadership to deliver digital solutions and technology enabled care services.

From the mid-2000s, additional investment (and leadership) was provided by the Scottish Government for the use of proven technologies in health and home settings. Technology has been explicitly regarded as a tool to support formal health and social care integration (legislation from 2016). The most recent focus, from 2018, has been the National Education for Scotland Digital Service (NDS) work to create a National Digital Platform for sharing health and social care information.

The critical success factors in the Scottish Health IT implementation journey have included:

- ongoing governmental commitment in policy and resources,
- supportive leadership across health and care, which identifies the role of technology as part drive towards integrated health and care,
- enduring support to work with citizens to develop more user centered services,
- iterative developments, building on success towards implementation at scale.

The current ambition in Scotland is to deliver a national platform that is a truly accessible and integrated system. This exemplifies the "once for Scotland" approach which is most tangibly demonstrated by the work led (since 2018) by National Education for Scotland's Digital Service (NDS) to create a National Digital Platform. Scotland has developed strategies at the national level, relying on shared vision and leadership across stakeholder organizations which engage with citizens.

The Context: Terminology, History, Current Status of Health IT

Terminology and Definitions

As technology has evolved, the associated terminology has also evolved and there is a blurring of the way terms such as Health IT (or ICT), eHealth, and digital health are defined and used.

Health IT (ICT) and health telematics were common terms in the 1980s and the 1990s and referred to the design, development, creation, use, and maintenance of information systems for the healthcare industry. The Electronic Health Record (EHR), a person's official, digital health record, is the central component of the Health IT infrastructure. Other key elements of the Health IT infrastructure are the Personal Health Record (PHR), which is a person's self-maintained health record, and the Health Information Exchange (HIE), a health data clearing house or a group of healthcare organizations that enter into an interoperability pact and agree to share data between their various systems [5].

eHealth made its appearance in the mid to late 1990s as the Internet exploded into public consciousness, and a number of "e-terms" began to appear and proliferate such as: "email" and

"e-commerce." Pretlow defined "Ehealth as the process of providing health care via electronic means, in particular over the Internet" [6].

Later definitions became increasingly general such as the World Health Organization (WHO) definition: "Ehealth involves a broad group of activities that use electronic means to deliver health-related information, resources and services: it is the use of information and communication technologies for health" [7].

Digital Health—The European Commission definition of eHealth transitioned into Digital Health and Care as a result of the concept of the Digital Single market—the 2014–2019 strategy of the European Commission [8]. The EC defines digital health and care as the "tools and services that use information and communication technologies to improve prevention, diagnosis, treatment, monitoring and management of health and lifestyle" [9].

The WHO proffered the following definition: The term digital health is rooted in eHealth, which is defined as "the use of information and communications technology in support of health and health-related fields." Mhealth is a subset of eHealth and is defined as "the use of mobile wireless technologies for health." More recently, the term digital health was introduced as "a broad umbrella term encompassing eHealth (which includes mHealth), as well as emerging areas, such as the use of advanced computing sciences in 'big data,' genomics and artificial intelligence" [10].

In summary, the change in terminology has been propelled by the changes in types of technology and what technology enables us to do. Health IT was geared to the computerization of healthcare organizations and systems—the development of health information systems to manage healthcare both administratively and clinically—the foundation of the latter being the Electronic Medical Record, and subsequent technologies for exchanging healthcare data among healthcare providers and for supporting clinical decisions. eHealth came into being with the emergence of the Internet and heralded the inclusion of the patient as a more active participant, generally by enabling him/her to access information from his/her medical record via a portal, make appointments online, and similar activities. The broad uptake of mobile technology—particularly mobile phones, and medical devices with Bluetooth—propelled us in the direction of patient empowerment and fueled the potential for the "digital revolution in healthcare." This was also driven politically by governments and countries facing challenges of sustainability of healthcare systems due to rapidly aging populations and the increasing burden of chronic disease—demanding greater coordination of care. Digitally enabled integrated care has come to be perceived as the potential solution to these challenges.

An additional set of terms in the context of "digital health" that are often used interchangeably are telehealth, telemedicine, and telecare.

The term **telehealth** is an all-encompassing one. Telecare and telemedicine are generally covered within the broader scope of the term telehealth. Telehealth technology enables the remote diagnoses and evaluation of patients in addition to the ability to remote detection of fluctuations in the medical condition of the patient at home. It also allows for e-prescribing of medications and remotely prescribed treatments [11].

Telecare is the term that relates to technology that enables patients to maintain their independence and safety while remaining in their own homes. Telecare includes electronic devices combined with ICT and professional practices applied to assist and care for people from a distance. Telecare includes services such as monitoring, assistance, information, consultation, and communication [12].

The term **"telemedicine**" has a narrower scope than that of telehealth. Telemedicine refers to the use of information technologies and electronic communications to provide remote clinical services to patients. The digital transmission of medical imaging, remote medical diagnosis and evaluations, and video consultations with specialists are all examples of telemedicine [13]."

Brief History of Health IT and Telemedicine

The roots of the Health Information Management industry can be traced back to the 1920s when healthcare professionals started using medical

records to document details, complications, and outcomes of patient care [14].

Dr. Lawrence Weed, a professor of medicine and pharmacology at Yale University, created the first problem-oriented medical record (POMR) to organize the information used in medical records. The POMR was the world's first EMR in 1968.

The introduction of the desktop personal computer really ushered in the modern age of healthcare information technology in the 1980s. HMOs in the USA were among the earliest adopters of Health IT. A study by Kaiser Permanente in 2013 showed that by 2011, 100% of HMOs had implemented Electronic Health records [15]. In Europe, early innovators and adopters were Scandinavian countries such as Sweden, Denmark, and Norway where in the mid-1980s, computer support for medical records really started to emerge [16].

Denmark now has a centralized computer database to which 98% of primary care physicians, all hospital physicians, and all pharmacists now have access. Over 95% of Norwegian GPs have been using an EMR for the past 10 years [17].

Telemedicine—provision of care remotely—has been making its mark on the healthcare community for decades beginning in the United States during the American Civil War with the use of the telegraph to communicate casualty reports, coordinate patient transport, and request medical supplies. In the late 60s and 70s, home monitoring developed more fully in the Mercury space program when the National Aeronautics and Space Administration (NASA) began performing physiologic monitoring over a distance [18].

Rashid L. Bashshur and Gary W. Shannon traced the origin of modern telemedicine applications in Europe beginning with long-distance transfer of ECGs in 1905 by Willem Einthoven, a Dutch physician [19]. The '80s brought telehealth to radiology when images were sent and received for telehealth consultations.

The aging of the population over the past several decades, together with the rapid development of ICT, has led to an increasing focus on telecare. Telecare technology began with social alarms, graduated to more automatic responses based on sensor information and today, focuses on the generation of integrated systems aimed at enhancing the user's quality of life [20].

The Current Situation in Europe: Gaps and Challenges

"The Communication of the European Commission on eHealth—of 2004 [1] making healthcare better for European citizens: An action plan for a European eHealth Area (eH-AP)," provided the impetus for the widespread development of eHealth in Europe. Member States of the European Union (EU) committed themselves "to develop a national or regional roadmap for eHealth."

A Study of European eHealth Strategies and National eHealth Competence Centres (NeHCs) in Europe in 2018 by EHTEL [21], identified trends in eHealth strategies that signal both the evolution of eHealth technologies and how they are being adopted in National and Regional strategies within the EU.

- The strategies developed between 2004 and 2010 focused on developing the basic infrastructures for implementing electronic health records at the healthcare provider level and exchange of electronic information among providers.
- Strategies published between 2011 and 2013 placed emphasis on moving from organizational and regional systems to National IT systems and setting up central electronic health records at a national level. Strategies placed increasing emphasis on telemedicine and telehealth, patient portals, and Personal Health Records.
- In 2014, strategies began to use the term "digitalization of Healthcare" including digital workflows, patient pathways, and the integration of information from diverse healthcare delivery technology-based systems. There was increasing emphasis on patient-centered care including patients, their carers, and their

systems and the integration of monitoring devices and sensors.
- The most recently updated strategies address the integration between health and social care supported by digital systems. The focus is on patient-centered care, as well as empowering health and social care professionals—using digital tools and apps. Mobile technology is almost taken for granted. The Digital revolution is perceived as a key mechanism for service transformation—bringing care to the citizen—wherever he might be. Many systems have already developed or are developing comprehensive electronic databases and thus we have entered the era of "big data" and strategies for the effective use of data. Cybersecurity has become a key issue and States are setting innovation leadership objectives for themselves in this "brave new world."

On 25th April 2018, the European Commission published the Communication on Digital Transformation of Health and Care in the Digital Single Market [22] that identified three priorities:

- Citizens' secure access to their health data, also across borders.
- Personalized medicine through shared European data infrastructure.
- Citizen empowerment with digital tools for user feedback and person-centered care.

While there is a great deal of strategic discussion across Europe, actual implementation has been variable. Clayton Hamilton, Technical Officer, Digitalization of Health Systems, Division of Health Systems and Public Health, World Health Organization (WHO) Regional Office for Europe, noted that:

"While a handful of countries in Europe have made significant progress in reorienting their health systems to capitalize upon the advantages which digital health and high-quality data can offer, the reality of the situation across the majority of European countries is a starkly different one. Health systems are still often fraught with piecemeal technology implementations, data interoperability across institutional and regional boundaries is poor, governance and financing for digital health is lacking, and health care professionals often feel ill-equipped in their use of the available technologies (in addition to feeling overwhelmed by the burden of data entry). Ensuring that these complex, systemic barriers are appropriately addressed by national digitalization programs requires that the strategic focus remains centered on developing and contextualizing the fundamental building blocks of digital health, that investments are aligned to key health policy objectives, and that the trust of health care professionals and the public in their use of digital solutions is well-established" [3].

Health IT Today in the USA

The Health IT journey in the USA has been significantly different from that in Europe due to the fact that the USA is a highly pluralistic system, dominated by private healthcare providers and multiple payers. In 2004, President Bush signed an Executive Order titled the President's Health Information Technology Plan, which established a ten-year plan to develop and implement electronic medical record systems across the USA to improve the efficiency and safety of care [23].

The executive order signed by President Bush established the Office of the National Coordinator for Health Information Technology. ONC is the principal federal entity charged with coordination of nationwide efforts to implement and use the most advanced health information technology and the electronic exchange of health information.

In addition to setting policy and enacting legislation, a key strategy for promoting the implementation of Health IT in the USA has been financial incentives. The American Recovery and Reinvestment Act, signed into law in 2009 under the Obama Administration, provided approximately $19 billion in incentives for hospitals to shift from paper to electronic medical records. Meaningful Use, as a part of the 2009 Health Information Technology for Economic and Clinical Health Act (HITECH) was the

incentive that included over $20 billion for the implementation of HIT alone. The sooner that healthcare providers adopted the system, the more funding they received. As of 2017, nearly nine in ten (86%) of office-based physicians had adopted any EHR, and nearly 4 in 5 (80%) had adopted a certified EHR. In 2017, 96% of all non-federal acute care hospitals possessed certified Health IT.

A major challenge in the United States has been the lack of interoperability among Health IT systems that has impeded sharing and exchange of health care data among professionals and among healthcare providers. Despite the obstacles, the USA has made dramatic advancements in digitizing the care delivery system during the past decade:

- Over one-half of office-based professionals and more than 8 in 10 hospitals are meaningfully using electronic health records (EHRs), which will require them to electronically exchange standardized patient information to support safe care transitions.
- One-half of hospitals are able to electronically search for patient information from sources beyond their organization or health system.
- All 50 states have some form of health information exchange services available to support care.

In 2014 the Office of the National Coordinator for Health Information Technology published a 10-Year Vision to Achieve an Interoperable Health IT Infrastructure in the USA [4].

Health IT Implementation in Israel and Scotland: An In-depth Analysis

Overview

Both Israel and Scotland were among the early adopters and implementers of Health IT. It is valuable to learn from their experience in implementing Health IT as the structures of their healthcare systems are very different and there have been some notable differences in implementation approaches, while at the same time, there have also been commonalities and similar critical success factors.

Implementation of Health IT in Israel

Israel is one of the global pioneers in health information technology, a digital revolution that began in the early 1990s. Israel has a mandatory National Health Insurance system that requires all of Israel's nine million citizens to register in one of four National Health Plans which are obligated to provide their members with all of their healthcare, as defined in the public basket of services (updated annually). Israel's Health Plans (HMOs—both insurers and providers), notably Clalit and Maccabi Healthcare Services, which today serve about 80% of the Israeli population—led Israel's Health IT revolution, which resulted in the implementation of electronic medical records used by virtually 100% of the country's population, the vast use of laboratory and imaging information systems, computerized physician order entries, and e-prescribing [24].

Maccabi Healthcare Services was the first of Israel's four national health plans to develop and implement a comprehensive EHR based IT system and can be considered among the early pioneers in this field, having initiated the development of its system in the mid-1980s [25].

Clalit Health Services was the world's first health plan to implement a health information exchange, enabling the creation of patient files that could include data and information input from various treatment sources, such as clinics and hospitals. Israel was also one of the first countries to use telemedicine, with the initial focus on tele-diagnostics such as teleradiology and tele-ECG, and to introduce electronic clinical decision support systems and online indicators for medical and service quality [24].

Israel prides itself on a quality digital healthcare system and on its technological and enterprising spirit. After a two-decade investment in medical digital documentation, Israel has over 25 years of comprehensive and longitudinal digi-

tal medical data and is growing hundreds of start-ups in the health field. Led by the Ministry of Health and the Headquarters for the National Digital Israel Initiative through the Ministry of Social Equality, in collaboration with the Prime Minister's Office, the Treasury, the Innovation Authority, the Planning and Budgeting Committee, and the Ministry of Economy, the Israeli Government set its sights on advancing digital health as a national engine of growth in March 2018. The decision is centered on removing regulatory and infrastructure obstacles hindering collaboration between health data-centric sectors, and on the Mosaic Project, whose objective is the establishment of a genomic clinical database that would enable R&D of products that advance personalized medicine.

A digital health program which was launched as a result of this decision has already begun to operate on several fronts. The national big data infrastructure for R&D in the field of healthcare includes: a telemedicine infrastructure, the Halev infrastructure (the patient at the center) aimed at synchronizing interorganizational processes in the healthcare system (such as making an appointment for a medical procedure which is currently the patient's responsibility), and a new more sophisticated version of medical information exchange between medical professionals within the healthcare system.

With a view to the future, and with suitable processive and regulatory infrastructure, the Ministry is anticipating health services to be based on an integration of capabilities from all these infrastructures. An example is a telemedicine infrastructure that would link devices in possession of patients or their primary medical professionals, to health data in the Eitan EHR exchanges system based on IoT (Internet of Things) capabilities [26].

These capabilities in information, communication, mobile, and cyber technologies, complemented by more than 25 years of experience in implementing Health IT, electronic medical records, and business analytics have created a strong foundation for Israel's ongoing developments in health analytics [27].

One of the defining features of the Israeli healthcare system is the relative autonomy of the Israeli HMOs, within the overall framework of the National Health Insurance Law, and the competition among them. The implementation of Health IT in Israel was HMO-driven. Strategy for Health IT existed at the beginning only at the individual health care organization level. All of the HMOs had fully implemented organization-wide EMRs by the time the Ministry of Health began to take an active role and the Ministry's initial focus was on the implementation of Health IT in hospitals, as the largest owner and operator of hospitals in the country. It is only in the last decade that the Ministry of Health has taken an active leadership role, including the creation of the National EHR exchange to enable medical care data exchange among HMOs and hospitals. Today, the Israeli Ministry of Health has developed a digital healthcare strategy, and is working closely with all of the stakeholders to implement it.

As the foundation of the implementation of Health IT in Israel was HMO-driven, understanding the management strategies and principles at the HMO level is key to understanding the success of the Israeli Health IT system [24, 25, 28, 29].

The Maccabi Story

Maccabi Healthcare Services, the second largest HMO in Israel currently providing services to more than two million people, i.e. 25% of Israel's total population, was the first of Israel's HMOs to implement Health IT. In 1983, Maccabi recognized that the healthcare system of the future would require sophisticated information and communication technology for efficient management, as well as effective and innovative health care services delivery. It aimed to use Information and Communication Technologies (ICT) to create a comprehensive, progressive, and fully computerized system. The idea was to develop a networked infrastructure at all levels (administrative, diagnostic, therapeutic, and preventive) to

connect physicians, nurses, therapists, primary carers, and patients.

Maccabi was one of the first healthcare organizations internationally to implement an organization-wide EMR. Maccabi began this process in 1987, and, by 1994, all Maccabi-affiliated physicians were using the Maccabi EMR. Its major objective was to support the clinicians and consequently, as it computerized its medication prescribing, its imaging services and its laboratories, all were integrated with the EMR so that the clinicians had all of the information at their fingertips in real time to support their clinical decisions, supported by a clinical decision support system. The EMR system was expanded to include nurses and healthcare professionals on the same platform. In 2001, this vision was extended to the Maccabi member, who has always been viewed as the center of the system, with the creation of "Maccabi online"—Maccabi's patient portal, giving the patient access to his medical information and other online services. Maccabi's Health IT system has continued to evolve in the ensuing years. The EMR is used by all of the health professionals and relevant administrative personnel and all providers and health services are electronically interconnected online and with continuous clinical data exchange taking place in real time. There is a platform for team coordination and integrated care for complex patients. The system supports a vast array of telemedicine features, for diagnosis, treatment, and patient management. "Maccabi Online"—the patient portal—is highly interactive enabling the patient to request online referrals and prescriptions and receive the referrals and prescriptions online with an electronic signature. In fact, the whole process is now paperless—patients come to the pharmacy or the lab with only their Maccabi card in hand—the prescription or referral is in the system. In addition, patients can ask and receive answers to questions from their doctors. All of this can be done via the "Maccabi online" app as well as by PC. Maccabi doctors also have an app that gives them access to their patients' EMR.

The Maccabi IT story began with a new CEO in 1982—a young and dynamic leader, experienced in the management of public service organizations. He perceived the need for computerized management information systems and set up an IT steering committee (which he chaired) with four subcommittees, reflecting the first priority areas for computerization—members, doctors, hospitals, and finances. Members were the first priority and work on computerization of member information began in 1984. The doctors were next. In 1986, the Maccabi Independent Physicians organization agreed to be a full partner in the implementation of a computerized medical record in all physician clinics. In 1988, Maccabi issued a magnetic membership card to all its members, to be presented at every point of service, thereby enabling the system to capture all of the members' transactions with the healthcare delivery system. The organizing principle of the Maccabi IT system—both administrative and clinical—was the member ID. Maccabi entered into a contract with an Israeli technology company, Rosh Tov and the two organizations set out on the journey to build the Maccabi EMR together—a partnership that continues until today.

What Were the Management Principles That Were Critical Success Factors in the Implementation of Health IT in Maccabi?

Innovative leadership—In Maccabi, innovative leadership included not only vision and commitment, but also hands-on involvement of top management, willingness to step in to solve problems and, of course, willingness to invest and commit organizational resources to the process.

Involving key stakeholders: After an initial planning and evaluation process by professional staff, Maccabi raised the idea of computerizing Maccabi-affiliated independent physicians with the Independent Physicians Organization and it was agreed to set up a multi-disciplinary committee comprised of representatives of the independent doctors and senior staff from the Maccabi Medical Department and IT Department. The committee examined the needs of the organization and the doctors which could be addressed by the system, as well as the barriers and the chal-

lenges. The decision to enter into the development of the system was a joint decision of the organization and the doctors.

Assessment—Assessment was done at 3 levels: the steering committees composed of administrative, clinical, and technological staff members, with expert outside consultants, set up in 1983; the above-mentioned assessment of needs together with the doctors, and in 1991, a two-day workshop with the senior multidisciplinary staff of the organization and the physician leadership. In preparation for the workshop, a great deal of effort was invested in research and fact finding and identification of options, so that the assessment and decisions made had a solid foundation.

Clear identification of concrete needs and the goals to be achieved: From the outset Maccabi, as an organization with responsibility for managing its processes and resources, had a clear vision of what it wanted to achieve which was articulated by the steering committee. The essential partner, and potentially the major obstacle, was the doctors. Therefore, it was especially important to make sure that the benefits to the doctors were clear and visible. In Maccabi, the physician was able to perceive four benefits that were realized within a very short time after implementation:

- The magnetic membership card automatically populated the physician's record with the patient's demographic information, saving the physician time in writing or entering the information;
- The membership card generated an online connection to the Maccabi database for verification of the patient's eligibility to receive services, guaranteeing that the doctor would be paid for the visit;
- The opening screen presented the doctor with a summary of the medical information on the patient, including major problems, diagnoses, allergies, and medications;
- Once the doctor entered a diagnosis for the visit, the information was transmitted and the claims adjudication process was initiated, saving additional entry and paperwork for billing.

As the system became more sophisticated, more benefits were realized. For example, e-prescriptions are automatically screened online in real time against the total database by a drug utilization review program, thus helping the doctor avoid adverse drug events; electronic referrals for diagnostic tests ensure that the results are automatically transmitted back to the doctor's computer; online consultation among physicians and between doctors and patients saves time for both doctors and patients.

Integrated responsibility: The designation of an active integrating body responsible for developing and managing the system was a key success factor. In Maccabi, the Director of Organization and Information Systems was designated as the person responsible for developing and implementing the Maccabi Health IT system. He worked with a small dynamic team, including a senior director of the Medical Department, with the complete backing of the CEO and his direct involvement when key decisions needed to be made. There was ongoing liaison and continuous dialogue with leaders in the physician community.

Clear strategy and organizational process—a collaborative process: The strategy for achieving the goals of the project was comprised of the following components and steps:

1. Joint physician/Maccabi medical and IT staff committees were established for every medical specialty to develop the functional specifications needed for each specialty, to oversee the adaptation of the core medical record and to provide ongoing feedback during implementation.
2. A minimum data set was agreed upon, with the gradual addition of new fields and tools over time.
3. It was agreed at a very early stage what the doctor would see first when he opened the EMR—a summary page with the most relevant patient data. The EHR was designed to support his workflow—not change it.
4. In the case of each additional field or tool, the rationale was presented, and the benefits to the doctor, patient, and/or organization were clearly delineated.

5. New networking capabilities were systematically developed and each brought with it relevant changes to the EMR, for example, with the computerization of the lab came electronic referral to the lab and the ability to electronically transmit lab results directly to the doctor's EMR.
6. The uptake of the EMR was also gradual, beginning with doctors who volunteered to pilot the system. After a successful pilot stage, it was agreed that using the EMR would be voluntary for doctors currently under contract but mandatory for new doctors. This continued until the majority of doctors were in the system, at which point it became a condition of "doing business" in Maccabi.
7. Incentives were offered to help persuade existing doctors to start using the EMR. For example, the use of the EMR was linked to more rapid processing of claims and earlier payment to doctors. Through collective procurement, Maccabi reduced the costs of purchasing PCs. Doctors who implemented the EMR received a modest increase in fees. Financial incentives are critical, at least at the beginning of the process. At a very minimum, introducing an EMR-based system into a doctor's clinic should not constitute a financial burden. Maccabi offered a financial incentive and simultaneously reduced the financial burden of computerization.
8. Physician support: At the outset, the physicians did not have to make purchasing decisions on their own and they had a clearly responsible body to turn to in the event of a problem. There was a major investment on the part of Maccabi in training and assisting doctors in developing new skills and making the most of the new technology at their disposal.

The analysis of the Maccabi Healthcare Services experience in developing and implementing an EMR-based health information system identified ten critical success factors.

Five critical success factors fall under the heading of **"innovative leadership"**:

1. vision and making the decisions necessary to implement;
2. clear commitment and involvement of leadership throughout the process;
3. appointment of an authorized health system integrator;
4. addressing tangible, practical needs;
5. establishing an organizational process for implementation and monitoring achievement of objectives.

The second set of critical success factors are grouped together under the heading of "**partnership and collaboration with clinicians and other end users**" and include:

6. establishing a multi-disciplinary working group consisting of managers, clinicians, and IT people at the outset to create a joint vision of the Health IT system upon which the decision to enter into the process is based;
7. financial incentives for clinicians;
8. establishing an ongoing collaborative process;
9. making sure that benefits for clinicians are clear and visible;
10. providing training and ongoing support to clinicians.

Ongoing deployment and expansion of Health IT continued following the initial implementation process described above, which took about four years. Once the basic EMR was in place for all of the medical specialties, the EMR was expanded to include nursing and the other healthcare professions. Additional systems and features were added during the second half of the 1990s, including the Lab and Radiology information systems enabling computerized physician orders and automatic receipt of test results, computerized drug prescriptions, the clinical decision support system, teleradiology, tele-ultrasound, tele-ECG, tele-dermatology, and call centers. In 2001, the patient portal went live and now includes online appointments, online electronic prescriptions, virtual visits. Additional developments have been the secondary use of data for research using an ever growing database, and increasing use of telemedicine. Many of the same

management principles continue to be crucial, they just change form. A multi-disciplinary Health IT Steering Committee was formed (that continues to operate today), headed by the CEO, to steer the process, set priorities, evaluate new technologies, and approve the Health IT yearly budget. The IT department expanded as the IT system and functions expanded. A crucial milestone was the creation of the Medical Informatics Department responsible for coding, standards, data quality, the clinical decision support systems, the disease registries, and the ongoing partnership between the clinical departments and the IT department. The expanding role of mobile applications as an integral part of the system has been a game-changer.

From a national perspective, one of the crucial drivers in the ongoing evolution of digital health has been competition, particularly competition among the HMOs in digital innovation. There is also competition for digital excellence at the hospital level. Both HMOs and hospitals partner with Israeli Tech companies and these collaborations are receiving increasing financial support from Israel's innovation Authority.

Implementation of Health IT in Scotland

The National Health Service in Scotland is the publicly funded healthcare system accountable to the Scottish Government. It is comprised of fourteen geographic health boards and seven national health boards and one public health body, which provide services for the population of 5.4 million people.

If you are living in Scotland, you need to register with a local Scottish General Practitioner (GP). The majority of health care provision in Scotland is provided by the public sector (NHS Scotland) and is paid for through taxation. Private healthcare is limited in Scotland, and is paid for through a private healthcare insurance scheme (usually offered to employees by private companies as part of their employee benefit package), or by individuals.

The sociopolitical context in Scotland is relevant to note. In Scotland, the Scottish Parliament and Scottish Government were established in 1999 by an Act of the UK Parliament. Under this Act (Scotland Act 1998) [30] a range of powers including health and social services were devolved to Scotland.

A number of localized IT systems grew across the United Kingdom in the 1990s. In Scotland, this trend towards a proliferation of localized Health IT systems was slowed by a move to unify the number of Health Trusts and Health Boards, resulting in the formation of fourteen geographic health boards and seven national special health boards [31].

Significant early Health IT initiatives in Scotland included the development (from 1984 onwards) of the General Practice Administration System for Scotland (GPASS), a publicly owned electronic health record for primary care [32].

While a single shared electronic health record is not yet in place, the fact that Scottish health organizations can communicate and exchange information by means of the National Information Systems Group (known as the Scottish Care Information (SCI) Gateway) means that significant pieces of the EHR jigsaw are in place [33].

The current ambition in Scotland is to deliver a national platform that is a truly accessible and integrated system. This exemplifies the "once for Scotland" approach which is most tangibly demonstrated by the work led (since 2018) by National Education for Scotland's Digital Service (NDS) to create a National Digital Platform. Scotland has developed strategies at the national level, relying on shared vision and leadership across stakeholder organizations which engage with citizens.

An early step in Scotland's progress towards national connected systems and telehealth was the introduction in 2001 of NHS 24 as a National Special Health Board. NHS 24 began as a telephone-based triage service to cover the out-of-hours period. The triage process out-of-hours has, in turn, been supported by the introduction of the Emergency Care Summary in Scotland. Piloted in 2004, with full national

rollout from 2006, the Emergency Care Summary (ECS) is a national information system which hosts a secure central record derived from the GPs' primary care record and automatically updated twice daily [33]. It contains a record of an individual patient's demographic data, medicines prescribed, allergies, etc. In 2012, the Key Information Summary was introduced to allow information to be shared among health workers, doctors, ambulance crews, off-duty doctors, hospitals, pharmacies, and treatment centers.

Critical to the mainstreaming of telehealth in Scotland was the establishment in 2006 (by the Scottish Executive) of the Scottish Centre for Telehealth (SCT) to support NHS Boards to implement telehealth. At that time, Scotland was the only country in Europe that had both a national organization with a specific remit for telehealth and a national strategy for telehealth [34].

In April 2010, SCT was integrated with one of Scotland's 7 special Health Boards, NHS 24 [35], thus providing a national reach for its work. Founded in 2001, NHS 24 is Scotland's national telehealth and telecare organization. This special Health Board operates a national telephone health advice and triage service for Scottish citizens that covers the out-of-hours period. NHS 24 has expanded over the intervening years, with over 1.5 million calls received annually to its 111 service. In addition to its telephone-based services, it provides web-based information resources to connect with and provide health information to citizens.

In 2010, the Scottish Centre for Telehealth took over responsibility for delivery of the national Telecare Program and was rebranded as the Scottish Centre for Telehealth and Telecare (SCTT). The SCTT had the unique remit of supporting stakeholders, across all sectors, with the delivery of the Scottish Government's digital health and care objectives. Working with health, social care, local authority, housing and voluntary sector organizations in Scotland, and facilitating knowledge exchange and research with international partners, created a successful ecosystem to develop and test digital health and care solutions with a view to implementing successful sustainable services at scale.

Since 2019, the work streams initiated by the SCTT continue to be supported by the Scottish Government's Digital Health and Care Directorate and are now embedded into its work programs [36].

What Were the Principles That Were Critical Success Factors in the Implementation of Health IT in Scotland?

Policy commitment: there has been government support in Scotland since the mid-2000s for what is now referred to as digital health and care. This support, which encourages "tests of change"—iterative developments at local and regional level followed by mainstreaming into routine service, has produced an environment where ICT is viewed as essential to the modernization of health and social care service delivery.

Working in partnership across the health and care landscape: strong relationships and leadership, which recognizes the role of digital solutions by senior organizational stakeholders across the public sector have been reinforced by ongoing support at government level.

Driving integrated services: in Scotland, technology has been explicitly regarded as a tool to support formal health and social care integration (legislation from 2016) and the wider application of digitally enabled solutions in health and care. There exists a clear timeline, in policy terms, for the building of support and integration of digital ambitions into Scottish approaches to health and care.

User centered: looking across the different phases of strategy development in Scotland, similar to the shifting language in other European strategies, there is a recognition of the crucial importance of user-centeredness, citizen empowerment and engagement for sustainable service delivery. The emphasis is on a person-centered approach to service design and improvement using the Healthcare Quality Strategy (2010) [37] as the policy framework that has connected all Scottish Government health and care strategies produced over the past decade.

NHS in Scotland: Stages of Development

In 2004, five years after the first Scottish Parliament was established, the Scottish Government commissioned Professor David Kerr to consider the future shape of the NHS in Scotland. The subsequent report "Building a Health Service Fit for the Future" (2005) [38]—most often referred to as the Kerr Report (2005), was aspirational in terms of the proposals and the timescales included.

The 2005 Report spoke with urgency about the need for a national ICT system, placing ICT at the center of discussions about the future of a high-quality healthcare system and recommended a "complete re-focus of the E-Health strategy" to work towards a single ICT system which included a nationally accessible EHR with functionality to include PACS, e-Prescribing, eBooking, Telehealth and Telecare, and patient access.

The Report also recommended the establishment of what was initially described as a "Telehealth Technology Resource Centre (TTRC)," to develop nationally applicable approaches to telehealth. In 2006, this recommendation became a reality with the establishment of the national Scottish Centre for Telehealth.

In 2005, the Scottish Government produced "Delivering for Health" [39], an Action Plan for the NHS, in part a response to the Kerr Report. Rather than a separate eHealth or Health IT Strategy, the Delivering for Health document accepted many of the recommendations around ICT and was followed in 2007 by the Scottish Government publication "Better Health, Better Care" strategy [40] which referred specifically, and in greater detail, to eHealth initiatives and committed to publishing a dedicated eHealth Strategy.

In 2008, the Scottish Government produced Scotland's first eHealth Strategy [41]. The Strategy covered the period 2008–2011 and marked an essential stage in defining, monitoring, and reporting on eHealth initiatives being delivered nationally (by Government) and through local health and social care authorities with support from delivery organizations and teams, including the SCTT, across Scotland.

Significant developments included the new GP IT system, finally moving away from GPASS which had been in place since the 1980s, delivered by NHS Scotland to GP practices. A consortium of Health Boards worked on the business case and a framework contract with two commercial products was in place.

In 2010, the Scottish Government produced the Healthcare Quality Strategy which built upon the Better Health, Better Care approach and which is often cited as a formative publication as it describes a unifying approach and a culture that promotes mutuality and participation by all those providing and receiving health and care services.

While the majority of the preceding government documents focused on healthcare, it is important, in the Scottish context, to recognize the work to extend and develop community based telecare systems which was taking place both at the policy level and, more widely, at an operational service level in the 32 local authority settings across Scotland.

In 2008, "Seizing the Opportunity: Telecare Strategy (2008–10)" [42] was published followed in 2011 by "Telecare to 2012: an action plan for Scotland" [43]. The priorities set out for Telecare complimented the eHealth Strategy by identifying areas of service need which, once again, took the iterative approach of building on assets and successes and learning from good practice elsewhere.

Priorities included using technology to:

- support self-management and those living with long-term conditions;
- improve service response, e.g. for people at risk of falling;
- monitor and develop anticipatory approaches which use technology to help keep vulnerable people safe in their own home.

In 2012, reflecting the combined approach of the Scottish Centre for Telehealth and Telecare, "A National Telehealth and Telecare Delivery

Plan for Scotland" (to 2015) [44] was published with support from the NHS, the Scottish Government, and the Convention of Scottish Local Authorities.

The next phase of producing updated and reflective eHealth/Digital health strategies takes us through the period from 2011 to 2020, with the publication of: the eHealth Strategy 2011–2017 [45] and the Digital Health Strategy 2018—present day [46].

The Digital First Service Standards (2016) make it clear that the accepted approach in Scotland for all Scottish Government services and services produced in partnership is to develop services that are consistently: user driven; accessible, and technology enabled. The shift in strategic approaches and definitions outlined earlier in this chapter, from a focus on ICT infrastructures towards a more inclusive understanding of technologies used to support health and wellbeing, is very evident in the Scottish context. The way in which health and social care services are planned and delivered across Scotland was changed by the *Public Bodies (Joint Working) (Scotland) Act 2014*. Local Authorities and Health Boards are required by law to work together to plan and deliver adult community health and social care services, including services for older people. This new way of working is referred to as "Health and Social Care Integration." In total, 31 Health and Social Care Partnerships have been set up across Scotland and they manage almost £9 billion of health and social care resources [47]. Progress towards shared records systems continues.

The current ambition in Scotland is to deliver a national platform that is a truly accessible and integrated system. This exemplifies the "once for Scotland" approach which is most tangibly demonstrated by the work led (since 2018) by National Education for Scotland's Digital Service (NDS) to create a National Digital Platform. The objective is a Platform approach for building a unified patient-centered record to support digital health and care services.

The main events on the timeline, as described in the chapter, are shown in Fig. 32.1:

Summary

There are two major differences between the implementation of Health IT in Scotland and Israel:

1. Scotland's implementation has been predominantly top-down and Israel's implementation has been bottom-up. Scotland has developed iterative strategies at the national level, whereas Health IT in Israel has been from grass roots, driven by the four HMOs that perceived the need at the organizational level and proceeded to develop and implement.
2. While both countries have implemented both Health Information management systems and

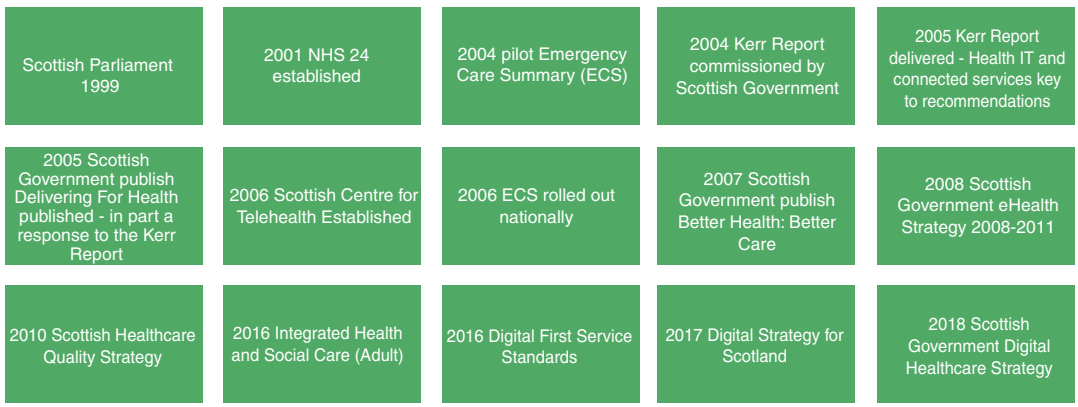

Fig. 32.1 NHS Scotland Stages of development—Main events on the timeline

telemedicine, Scotland placed higher priority on telehealth and telecare and Israel prioritized comprehensive shared electronic medical records supported by clinical decision support systems.

These differences in approach are derived from the structure of the two healthcare systems (Beveridgian vs Bismarkian), geopolitical and cultural differences as well as the maturity of available technology at the various stages of evolution. There is no right or wrong approach. The choice needs to be based on an assessment of the context. This is true regardless of whether the implementation is national, regional, or organizational.

For the most part, the management principles for implementation in both countries are strikingly similar and consistent with well-known change management principles—but also subtly different in the following ways:

1. Leadership—but not just any kind of leadership.
   - In Israel, we see innovative leadership that included thinking "out of the box," vision, appointment of an authorized health system integrator and team, but continued "hands on" commitment and support from the very top, willingness to take risks and willingness to invest and commit organizational resources to the process.
   - In Scotland, there is shared leadership with strong relationships and recognition of the role of digital solutions by senior organizational stakeholders across Scotland, reinforced by ongoing support at government level. There has been clear governmental support in Scotland since the mid-2000s for what is now referred to as the digital health and care agenda. Scotland also appointed digital health and care leadership and through the establishment of the national Scottish Centre for Telehealth and Telecare, and the Technology Enabled Care Program in Scottish Government to support Scottish stakeholders to implement telehealth and telecare.
2. Focusing on compelling needs of the intended users—and addressing these by showing clearly defined benefits. In very practical terms, this means addressing two questions: "where is the pain?" and "what's in it for me?".
   - In Israel, it was clear from the outset that the first primary user would be the doctors. They were frustrated by bureaucracy involved verifying patient eligibility for treatment and billing. They were also frustrated by the lack of clinical information on their patients. The electronic medical record addressed both of these issues and, consequently, the doctors perceived clear benefits from the implementation of the EMR. In addition, Maccabi provided financial incentives for the doctors. Once the bureaucratic issues were addressed, the need for clinical information became the central concern leading to the computerization of the lab system, teleradiology, and computerized prescriptions. Until 2000, the focus was on "IT to support the clinician"—including nursing and healthcare professionals, and it expanded to include the patient leading to the creation of the patient portal with the recognition of the crucial role of the patient in managing his care.
   - In Scotland, the perceived needs and benefits have also changed over time. The initial need was having critical information for the triage process out-of-hours that generated the introduction of Emergency Care Summary. The lack of symmetry between the geographical distribution of the population and healthcare facilities and professionals led to an early emphasis on the development of telehealth that drove the establishment of both a national organization with a specific remit for telehealth and a national strategy for telehealth. It also saw the establishment of a national Telecare Program in 2006 which led to the merging of the telehealth and telecare strategic agenda, led by the Scottish Government's Technology Enabled Care

and Digital Healthcare Innovation Division. The Scottish approach to the **integration of health and social care** was another driver leading to legislation to establish Health and Care Partnerships across Scotland. Technology is seen as an important tool to support the delivery of integration and the wider application of digitally enabled solutions in health and care.

The Covid19 pandemic is an example of compelling need that has driven a quantum leap in telehealth development and implementation in both Israel and Scotland as well as globally.

3. Focused and Concrete Collaboration and Communication.

   There are two critical actions that need to take place: building a bridge between management, clinicians, and IT and creating a close working relationship—not just talking to each other but making decisions together; and directly involving users—clinicians and ultimately citizens—in the actual work of design so that the system supports existing processes. By collaboration, we mean not just dialogue but all partners "getting their hands dirty."

   - In Maccabi—the decision to implement an EMR was a joint decision of management, clinicians, and IT staff, and the doctors designed the user interface and content of the EMR. There were Working Groups set up for every specialty—they decided on the content and appearance of every screen—as well as rules for the Clinical Decision Support System—a structure which continues to this day. Likewise, the member portal has been designed and redesigned based on active feedback from both clinicians and patients.
   - In Scotland, working in partnership across the health and care landscape occurred in successive stages of development of Scottish health and care IT. This is best exemplified by the merging of the Scottish Centre for Telehealth and Telecare within NHS 24. Working in partnership with health, social care, local authority, housing and voluntary sector organizations in Scotland and facilitating knowledge exchange and research with international partners have created a successful ecosystem to develop and test digital health and care solutions with a view to implementing successful sustainable services at scale.

4. Embedding IT in ongoing organizational processes.

   HIT implementation is not an ad hoc activity or a project. It is a way of life. The organizational chart and organizational processes need to support the day-to-day activities of implementation and monitoring achievement of objectives. In Maccabi, the multidisciplinary Steering Committee chaired by the CEO continues to guide the ongoing process of HIT implementation and development. In Scotland, this is reflected in the successive national digital health and care strategies that have been developed, published, legislated, financed, and implemented.

5. Providing training and ongoing support.

   Providing training and ongoing support to clinicians and health and care staff is crucial to the ongoing implementation and expansion of Health IT and the accompanying service transformation. In both Israel and Scotland, the doctors in the community are a special challenge as they are independent practitioners—not salaried staff. Maccabi has addressed this challenge using multiple approaches: All clinical staff, including independent physicians, cannot begin to care for Maccabi patients without a training course to use the Maccabi digital systems. When new features are added to the EMR that doctors are expected to use, these features are presented at professional conferences, doctors receive short instructional videos and are also taught how to use them at a time of their choosing by remote access instruction—on their own computers.

   In Scotland, the challenge of providing ongoing support to health and care staff is recognized in the 2018 Digital Health and Care Strategy (Domain D: Workforce Capability).

In addition to work-based training on individual systems, the components include: resources, networks, and training opportunities. Online resources provide entry-level content on digital health and care, freely accessible to all health and care staff [48]. More targeted (small group) support is available via the Nursing, Midwifery, and Allied Health Professions Digital Health and Care Leadership Programme hosted by NHS Education for Scotland, now in Cohort 14. Finally, the challenge is also addressed through both clinician specific networks for "eHealth Clinical Leads" and multidisciplinary knowledge exchange networks.

Conclusions and Outlook

There are two major conclusions and recommendations arising from the Israel and Scotland experiences that will impact the successful implementation of Health IT going forward:

1. Changing the semantic—not engagement and not empowerment.

   Human behavior, and particularly organizational behavior, is strongly influenced by the terminology we use and how it is perceived. Part of successful implementation is making sure that everyone involved in the implementation understands clearly what is expected of them and their relationship with others. In the successful implementation of digital health and care, the relationship of management and IT with clinicians and health and care staff is no longer an "engagement"—it is a "marriage" with all that it implies. It is a long-term intimate relationship in which the need for sensitivity to needs and the commitment to develop together is crucial. Likewise, we are not "empowering" patients and citizens—we are partnering them. Patients do not want us to send them home with a "self-care" kit—the therapeutic relationship is an integral part of care. Health IT supports this relationship—it is not a substitute.

2. Never refreezing.

   Implementation of digital health and care is a constantly moving target. In contrast to Lewin's three-stage approach to organizational change management—"Unfreeze, Change, Refreeze" [49] or Kotter's eighth step "establish the new status quo" [50], we cannot allow ourselves to rest on our laurels. The pace of technological change, as well as the advances in medical care and the healthcare needs of the population, is so rapid that we must put into place a process of ongoing transformation and openness. In both Israel and Scotland, successive new strategies driving new health and care innovations exemplify this new reality.

Useful Resources

- **Implementation Management Tools**
  Two key critical factors for successful implementation of Health IT are understanding the context in which we are implementing; identifying the gaps between where we are and where we want to be; and learning as we go—learning from our mistakes and correcting—to make sure we get there. We have found three management tools to be particularly useful: digital maturity assessment, quality improvement, and "Plan Do Study Act"—ongoing implementation analysis with corrective action.

- **Digital Maturity Assessment: The SCIROCCO Tool**
  Integrated health and care, enabled by digital technologies, is a recognized solution to address the challenge of aging population. Yet, regions and countries vary in their success and maturity to drive transformation of their health and social care systems towards more integrated digital health and care services. This was the main rationale for the development of the B3 Maturity Model for Integrated Care [51] as a framework to capture the different ways and rates of how integrated care has been designed and delivered. This work was undertaken as part of the European Commission's initiative European Innovation Partnership on Active and Healthy Ageing (EIPonAHA) [52]. Maturity

Models employ qualitative assessments of progress and may be regarded as a measurement of the ability of a health and care system to progress towards the integration of health and care. The higher the maturity, the higher the chances are that health and care service delivery will lead to improvement in the quality of care and more effective use of the resources. The original B3 Maturity Model was derived from interviews with stakeholders responsible for health and care delivery in 12 European regions [53]. They identified a number of areas that require to be managed in order to effectively deliver digitally enabled, integrated care—these were grouped into 12 "dimensions," each of which addresses a part of the overall transformation process The 12 dimensions are:

- Readiness to Change.
- Structure and Governance.
- Digital infrastructure.
- Funding.
- Process Coordination.
- Removal of Inhibitors.
- Population approach.
- Citizen empowerment.
- Evaluation methods.
- Breadth of ambition.
- Innovation management.
- Capacity-building.

The B3 Maturity Model has been further developed, validated, and tested through the EU Health program funded projects SCIROCCO [54] and SCIROCCO Exchange [55] (Fig. 32.2). The Tool is free to use and can be accessed using the following link: https://scirocco-exchange-tool.inf.ed.ac.uk/en_gb/. Each of the dimensions is further defined in terms of its objectives and assessment scale reflecting different level of maturity one can achieve (Fig. 32.3).

Fig. 32.2 SCIROCCO Self-assessment Tool for Integrated Care

Fig. 32.3 SCIROCCO Self-assessment Tool for Integrated Care Example

The Tool helps regions and countries to:

- Indicate their readiness and maturity to adopt and scale-up digital integrated care solutions;
- Understand the strengths and weaknesses of their local context for digitally enabled integrated care and inform national, regional and local policy-makers about potential areas of improvement;
- Capture the perceptions of multi-stakeholder teams on maturity of their organizations, regions, and countries to implement digitally enabled integrated care;
- Facilitate multi-stakeholder dialogue on progress towards digitally enabled integrated care.

The SCIROCCO self-assessment tool has been tested and used in more than 82 regions and organizations in Europe and beyond which reflects the needs for, and interest in, frameworks and tools that can support health and social care authorities to better understand how they can improve their progress towards digitally enabled integrated care. The Tool is available in 11 languages (Czech, English, Flemish, German, Hebrew, Italian, Lithuanian, Polish, Slovak, Slovenian, Spanish).

The Quality Improvement Approach

In Scotland, the Quality Improvement approach, which is core to Scotland's Healthcare Quality Strategy (2010), seeks to provide safe, effective, person-centered care [37], a simple objective which is hugely complete to deliver in practice. The methodology employed includes a number of tools and techniques and will include familiar elements:

- clarity about the improvement or change to be achieved;
- understanding the pathway, flow, or process of a treatment or intervention;
- understanding change in a systematic way which includes all those (staff and service users) involved;

- deploying structured tools and techniques to capture, measure, learn from and apply changes.

The techniques used include:

- Plan Do Study Act (PDSA) cycles—PDSA which make it possible to capture and use the results to support continuous improvement [56, 57].
- Process mapping—to map the journey taking into account the experiences of all roles involved [58].

In a progression from the policy and strategic developments outlined in Scotland up to the Healthcare Quality Strategy (2010) the Scottish Government established Healthcare Improvement Scotland in 2011. In addition, to the important work of regulation of independent hospitals and clinics, the remit for this organization includes working with health and care organizations to support continuous improvement as part of service redesign [59].

The Plan Do Study Act Methodology

In Israel, learning as you go and making adjustments along the way is a way of life. The PDSA methodology, articulated by Edward Deming and Walter Shewharts, presents a pragmatic scientific method for testing changes in complex systems [60]. PDSA cycles consist of a systematic series of steps for gaining valuable learning for the continual improvement of a product or process.

Each PDSA cycle consists of four steps [61], as demonstrated in (Fig. 32.4):

1. **Plan**—Plan the intervention, state the objective, and develop a plan to test the change.
2. **Do**—Try out the intervention, and document problems and unexpected observations.
3. **Study**—Analyze the data collected and study the results.
4. **Act**—Refine the change and determine what modifications should be made.

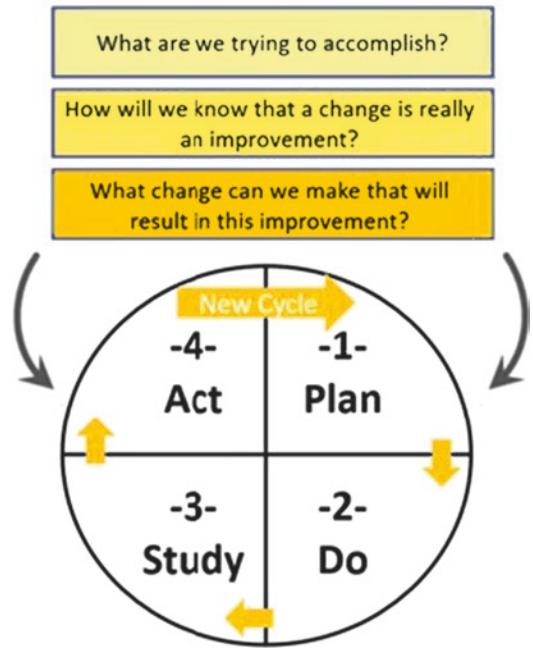

Fig. 32.4 Model for improvement (PDSA)

The PDSA methodology promotes learning through interventional experiments, in recognition of working in complex settings with inherent variability. The PDSA methodology provides overview, ownership, and involvement of stakeholders who at all times have insight on the intervention process. It provides flexibility to develop interventions according to stakeholder's feedback and changing conditions ensuring fit-for-purpose solutions, while providing the opportunity to build evidence for change. In both countries this has been enhanced in recent months due to the COVID crisis by additional processes for managing accelerated technology development such as the Agile methodology [62] in Israel, driving the collaborative effort of self-organizing and cross-functional teams and Rapid Response Tools and Processes in Scotland [63].

These flexible, responsive, and continuous improvement approaches have been used successfully in both Israel and Scotland to advance digitally enabled care for older people and the chronically ill, to support the ongoing digital

transformation of health and care and to enable rapid responses to new and unanticipated challenges.

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Review Questions

1. What was a key element in the Innovative leadership in Maccabi?
   (a) It focused only on vision and commitment.
   (b) The process completely ignored thinking about organizational resources.
   (c) It did not involve top management at all, but only operational staff members.
   (d) It involved hands-on involvement of top management.
2. According to Maccabi's experience, Involving key stakeholders should:
   (a) Come after an initial planning and evaluation process by professional staff.
   (b) always involve computerizing methods,
   (c) be performed by a multi-disciplinary committee,
   (d) a and c are correct.
3. According to Maccabi's experience, the design of a new EHR should:
   (a) Support the doctor's workflow.
   (b) Begin with a minimum data set.
   (c) should be gradual,
   (d) should not include incentives for the doctors,
   (e) a, b, and c are correct.
4. In Israel, from a national perspective, what is a key driver in the ongoing evolution of digital health?
   (a) Competition.
   (b) Israel's innovation Authority.
   (c) Incentives for the doctors.
   (d) Tech companies involvement.

5. The Scottish government report "Building a Health Service Fit for the Future" in 2005 made explicit the ambition for health IT in Scotland to do what?
   (a) support a competitive approach to identify health IT solutions,
   (b) completely re-focus the E-Health strategy' to work towards a single ICT system,
   (c) promote a variety of different system developments across the NHS,
   (d) seek investment from technology suppliers.
6. Select 2 of the Critical Success Factors identified by the authors in the Scottish deployment of Health IT:
   (a) large-scale investment by technology suppliers,
   (b) policy commitment and clear strategy,
   (c) supportive leadership across health and care,
   (d) financial incentives for health care staff.
7. Why was the publication in 2010 of the Scottish Healthcare Quality Strategy significant for the development of health IT?
   (a) it made clear that Health IT implementation was only the responsibility of hospitals,
   (b) it emphasized that leadership should derive from IT professionals,
   (c) it provides an approach which promotes service quality, mutuality, and participation by all those providing and receiving health and care services.
   (d) it set out the allocation of funding to develop health IT.
8. On reflection (after reading this chapter) do you think that the distinct approaches taken to the development and implementation of health IT in Scotland and Israel stem from:
   (a) sociopolitical differences,
   (b) differences in their readiness to adopt healthcare IT culture differences,
   (c) differences in when suitable technology becomes available,
   (d) differences in leadership approaches,
   (e) All of the above.
   (f) None of the above.
9. What is NOT true?
   (a) Scotland's implementation has been predominantly top-down and Israel's implementation has been bottom-up.
   (b) Both countries placed higher priority on telehealth and telecare.
   (c) Scotland has developed iterative strategies at the national level, whereas Health IT in Israel started at the organizational level.
   (d) Both countries have implemented both Health Information management systems and telemedicine.
10. These differences in approach between the implementation of Health IT in Scotland and Israel are derived from:
   (a) Differences in the healthcare systems (Beveridgian vs Bismarkian).
   (b) Geopolitical and cultural differences.
   (c) The maturity of available technology at the various stages of evolution.
   (d) All of the above.
11. What was learned about Focusing on compelling needs?
   (a) In Israel, the first primary user was the doctors.
   (b) In Scotland, the perceived needs and benefits changed over time.
   (c) In Israel, until 2000, the focus was on "IT to support the clinician".
   (d) All of the above.
   (e) None of the above.
12. What was learned about Embedding IT in ongoing organizational processes?
   (a) HIT implementation is not an ad hoc activity.
   (b) Finance issues should be put aside for proper implementation.
   (c) Multi-disciplinary Stakeholder commitment is a must have component.
   (d) a and c are correct,
   (e) All of the above.
13. What was learned about Changing the semantic?
   (a) Organizational behavior is strongly influenced by the terminology we use.

(b) It is important that everyone involved understands clearly what is expected of them.
(c) The relationship of management and IT with clinicians and health and care staff is crucial.
(d) Health IT supports the therapeutic relationship—it is not a substitute.
(e) All of the above.

14. The SCIROCCO Tool:
(a) Is a Digital Maturity Assessment Tool.
(b) Identified a number of areas that require to be managed in order to effectively deliver digitally enabled, integrated care.
(c) Can help regions and countries.
(d) All of the above.

15. The Quality Improvement Approach:
(a) Is core to Israel's Healthcare Quality Strategy.
(b) Includes a number of tools and techniques.
(c) Focuses only on understanding the pathway, flow, or process of a treatment or intervention.
(d) Is a different name for the PDSA cycle approach.

Appendix: Answers to Review Questions

Correct answers are printed in bold.

1. What was a key element in the Innovative leadership in Maccabi?
(a) It focused only on vision and commitment.
(b) The process completely ignored thinking about organizational resources.
(c) It did not involve top management at all, but only operational staff members.
(d) It involved hands-on involvement of top management.

2. According to Maccabi's experience, involving key stakeholders should:
(a) Come after an initial planning and evaluation process by professional staff.
(b) always involve computerizing methods,
(c) be performed by a multi-disciplinary committee,
(d) a and c are correct,

3. According to Maccabi's experience, the design of a new EHR should:
(a) Support the doctor's workflow.
(b) Begin with a minimum data set.
(c) should be gradual,
(d) should not include incentives for the doctors,
(e) a, b, and c are correct,

4. In Israel, from a national perspective, what a key driver in the ongoing evolution of digital health?
(a) Competition.
(b) Israel's innovation Authority.
(c) Incentives for the doctors.
(d) Tech companies involvement.

5. The Scottish government report "Building a Health Service Fit for the Future" in 2005 made explicit the ambition for health IT in Scotland to do what?
(a) support a competitive approach to identify health IT solutions,
(b) completely re-focus the E-Health strategy' to work towards a single ICT system,
(c) promote a variety of different system developments across the NHS,
(d) seek investment from technology suppliers,

6. Select 2 of the Critical Success Factors identified by the authors in the Scottish deployment of Health IT:
(a) large-scale investment by technology suppliers,
(b) policy commitment and clear strategy,
(c) supportive leadership across health and care,
(d) financial incentives for health care staff,

7. Why was the publication in 2010 of the Scottish Healthcare Quality Strategy significant for the development of health IT?

(a) it made clear that Health IT implementation was only the responsibility of hospitals,
(b) it emphasized that leadership should derive from IT professionals,
(c) it provides an approach which promotes service quality, mutuality, and participation by all those providing and receiving health and care services.
(d) it set out the allocation of funding to develop health IT,

8. On reflection (after reading this chapter) do you think that the distinct approaches taken to the development and implementation of health IT in Scotland and Israel stem from:
(a) sociopolitical differences,
(b) differences in their readiness to adopt healthcare IT culture differences,
(c) differences in when suitable technology becomes available,
(d) differences in leadership approaches,
(e) All of the above.
(f) None of the above.

9. What is NOT true?
(a) Scotland's implementation has been predominantly top-down and Israel's implementation has been bottom-up.
(b) Both countries placed higher priority on telehealth and telecare.
(c) Scotland has developed iterative strategies at the national level, whereas Health IT in Israel started at the organizational level.
(d) Both countries have implemented both Health Information management systems and telemedicine.

10. These differences in approach between the implementation of Health IT in Scotland and Israel are derived from:
(a) Differences in the healthcare systems (Beveridgian vs Bismarkian).
(b) Geopolitical and cultural differences.
(c) The maturity of available technology at the various stages of evolution.
(d) All of the above.

11. What was learned about Focusing on compelling needs?
(a) In Israel, the first primary user was the doctors.
(b) In Scotland, the perceived needs and benefits changed over time.
(c) In Israel, until 2000, the focus was on "IT to support the clinician".
(d) All of the above.
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