Stakeholder behavior in national eHealth implementation programs

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Abstract
As the capabilities of eHealth technologies have considerably improved over recent years, many countries have developed national programs to implement such technologies with the aim of increasing treatment efficiency and effectiveness beyond the scope of just a few individual healthcare providers. However, these programs are often longsome, costly and have previously been met with fierce resistance from key stakeholders. Two questions arise: firstly, why do national eHealth programs stall long before end-users are reaping the benefits? Secondly, what motivates stakeholders, particularly healthcare providers, involved in the rollout process to resist to the implementation of a potentially beneficial technology? Our study builds on a wealth of observatory qualitative data as well as semi-structured interviews to theorize that complex stakeholder structures across organizational levels offer an answer to these questions. Based on the case of the German Electronic Health Card ('eGK'), we propose that asymmetries amongst stakeholders' objectives can posit a cause for implementation issues, risks and failure. The theoretical and practical implications of these findings are discussed.

Introduction

Healthcare is generally regarded a basic necessity to a functioning society and as such governments across the world have continuously been looking for ways to improve treatment efficiency and effectiveness, also by applying information technologies within the healthcare sector. Over the years they have therefore initiated a number of national programs to technically integrate doctors and hospitals, such as the Health Information Technology for Economic and Clinical Health Act in the US, the European Union eHealth Action Plan 2012–2020 across the EU or the 'NHS Connecting for Health' as part of the UK Department of Health to name

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a few. Germany over the past ten years has introduced a law for the modernization of the German statutory health insurance system and has subsequently founded the 'gematik' (Gesellschaft für Telematikanwendungen der Gesundheitskarte mbh), a publicly owned organization responsible for the conceptual development and rollout of a nationwide eHealth system.

Given the substantial practical relevance of eHealth, it seems paradoxical that academic publications on this topic had for some time been falling short of actual system implementations [1]. Interest by researchers has, however, recently increased. Indeed, Agarwal et al. [2] and Anderson and Agarwal [3] have emphasized the importance of eHealth research given the healthcare sector's rapid pace of transformation and the consequent need to conduct further research on related phenomena. More recently, Romanow et al. [4] have created an extensive overview on the literature of eHealth, coding more than 200 papers published within the area since 2004. Their study reveals that much research carried out to date has focused on the adoption of eHealth infrastructures as well as the problems associated with those at an organizational level. Empirical data was often collected directly in hospitals. While we fully agree on the significance of these findings, given that hospitals and practices are the places where eHealth technologies are primarily installed, we observe that only a limited number of authors look at eHealth implementation programs from a national perspective. These, however, should not be neglected given their growing importance as governments aim to systematically integrate healthcare providers through standardized eHealth solutions.

Our paper focuses on the implementation of a large-scale eHealth program accentuating how key stakeholders on a national level can shape and potentially even forestall them. We follow Currie's [5] call for more studies on how data is shared on a national scale across different health environments, particularly in Europe or the US.

The paper is organized as follows: the theoretical foundations are discussed and the relevant literature published on national eHealth programs is examined. The literature analysis is followed by a case study whereby extensive empirical data was collected over a two-year period on the implementation of the 'eGK' (electronic health card) technology in Germany. We examine how complex stakeholder structures can lead to potential implementation failure. The results of our research are presented and discussed in the context of other literature on stakeholder behavior within eHealth. The paper concludes with a discussion of the theoretical and practical implications of our findings.

Literature overview on national eHealth programs

Remarkably, the existing literature on eHealth lays its focus on IS implementation programs at an organizational level, i.e. a single hospital. Building on Romanow et al.'s [4] recent literature overview in the field of eHealth we have used their search criteria to update their findings with another 14 papers published since in one of the most influential journals in the field of IS. Out of the total of 232 papers have identified only 33 studies wherein the authors have taken into account a so-called macro-economical perspective, in other words examining eHealth implementation programs of a national scale.

Previous studies offer an extensive but not always coherent list of critical factors for national eHealth programs, i.e. stakeholder involvement, expectation management, cost management, treatment of data privacy concerns, or the functionality of the eHealth technology itself. While these factors are identified by the authors as critical to a successful rollout of an eHealth infrastructure, the cases discussed in the various papers do not necessarily represent best-practice success stories. Indeed, the ignoring of such critical factors has also lead to failed implementation [6–8].

Besides, when examining these critical factors it strikes that they occur at different levels. Following Jensen et al.'s [9] definition these are: the macro-level (level of the organizational field), the micro-level (level of the organization) and the individual level (level of an individual, e.g. user of the technology). In total we have found nine out of those 33 papers which explicitly mention critical factors on at least two of those levels [6,7,9,10–15]. The literature therefore suggests that factors and stakeholders operating at all three levels should be analyzed when determining the success of national eHealth programs. Our analysis presented in the following aims at doing exactly that as we bring together the key stakeholders of all three of these levels into a single model in order to explain what has hindered the implementation of the 'eGK' technology in Germany so far. We use the case of the 'eGK' technology as it presents a suitable context of a nationwide eHealth implementation program and has also not yet been discussed in the literature examined above.

Case background: the 'eGK' technology in Germany

Germany offers a national healthcare system, wherein every citizen of the state is either statutorily or privately insured. Approximately 70 of the 82 million German citizens have a statutory health insurance plan with one of 132 health insurance companies [16]. The Ministry of Health assumes the governing body for the healthcare sector and is responsible for all national matters with regards to health, prevention and long-term care. It also regulates European and international health tasks. The provision and financing of public healthcare services is done through self-governing institutions, amongst others the statutory health insurance companies and associations of medical doctors. Expenditure of the healthcare sector in 2012 was ca. 300 billion € resulting mainly from expenditure of the statutory and private health insurance companies, expenditure from private households and organizations without commercial interest as well as goods and services provided in the context of ambulant treatments. This corresponds to approximately 11.3% of the German GDP [17]. Importantly, in Germany doctors, unlike in other countries such as the UK, are not employees of the government or specific payor institutions and therefore have a constitutionally

committed scope for discretion with respect to choosing the appropriate therapy or to voicing their opinion towards changes in the system, such as the potential introduction of new eHealth technologies.

In 2002, the lead associations of both payors (health insurers) and providers (doctors) decided to collaborate on the implementation of the 'eGK' technology, which was anchored into the German law to modernize the German public health insurance system (Section 291 Abs. 2a SGB V) in 2004. The conceptual and operational realization of this eHealth program was to be carried out by the 'gematik', which was founded in January 2005. The 'gematik' is responsible for the conceptual design, the certification and the management of the rollout of the various systemic parts to be installed at healthcare providers, at payor institutions, and in the (telematics) backbone. The 'gematik' is governed to equal parts by both the lead associations of payors and providers. Decision-making is regulated and requires 67% of the votes in the shareholders' meeting. Initial plans aimed at a full rollout by January 2006.

As opposed to other IT implementation programs observed in some of the existing literature the, 'eGK' technology is complementing the technology currently existent in German hospitals and practices with a high security environment that enables subsequent introduction of value-added and patient-oriented applications [10,18]. Thus, only the interfaces to the doctor's PC and the payor systems will have to be enhanced and configured. Other key components, such as the card-reading terminals, the Internet connection and most of the backbone infrastructure, will be installed and configured irrespective of the specific IT environment in the individual practice. This has proven a key pre-requisite to ensure a high-security environment which cannot be breached given the many IT-security and data privacy concerns (please refer to Figure 1 for a simplified depiction of the envisioned 'eGK' technology). Therefore, key components of the 'eGK' technology are not built on existing technology but are newly developed. The so-called "adaptability problem", which should be avoided by installing modularized information infrastructures, as suggested by Hanseth and Lyytinen [19], does therefore only partially apply to the 'eGK' technology. The installation process including the key components is paid for by the statutory health insurance institutions and will be provided to each practice and hospital.

Methodology

The empirical data examined in this paper was collected in two phases during the currently on-going implementation of the 'eGK' technology in Germany: firstly, two of the authors were closely connected with several related implementation projects and especially the day-to-day operation of a project between December 2010 and August 2011. This project contributed to the rollout of key 'eGK' components to approximately 71.000 practices, 41.000 dental practices and 2.000 hospitals. The authors were therefore part of countless formal and informal meetings with members of all stakeholder groups including the 'gematik', the Federal Ministry of Health, the Federal Office of Information Security, the Federal Commissioner for Data Protection and Freedom of Information, the lead associations of payors and providers, individual health insurance companies as well as several system providers and external consultants. Besides, several comprehensive reports and a very large number of emails exchanged were used as further data on this subject. Together, this rich account of the on-going activities provided an unparalleled insight into the program as it has unfolded over time. A major advantage of this approach was the longitudinal perspective which we were able to take, discussed as important when "the temporal scope … affect[s] the apparent origin and direction of many phenomena" [20, p. 23].

Further to these findings, we conducted semi-structured interviews with 14 interview partners from the key stakeholder groups identified in the first stage of the research process. The interview partners were chosen because of their expert knowledge as well as their direct involvement in the 'eGK' technology implementation project. They also represent each of the key stakeholder groups involved: the gematik, providers, payors, the government and the industry. We also interviewed an external consultant who was involved at several stages of the development process. Patients were not interviewed given that, while they have received the actual 'eGK' card itself, the 'eGK' technology as a whole has not been rolled out and they are hence not able to provide meaningful insights on the use of the technology. Due to the highly political nature of the subject, as this is still an ongoing project, not all interview partners agreed to be recorded on voice record. Not recording in such cases has been discussed as less of a concern but exact interview notes were taken throughout all interviews [21,22].

The average interview lasted one hour and all questions were addressed in all of the interviews. Firstly, the interview partners were asked to talk about their experience with the 'eGK' implementation project. Secondly, more specific questions were asked to ensure the comparability of the data from the interviews. Based on the previously gathered observatory data we offered a preliminary

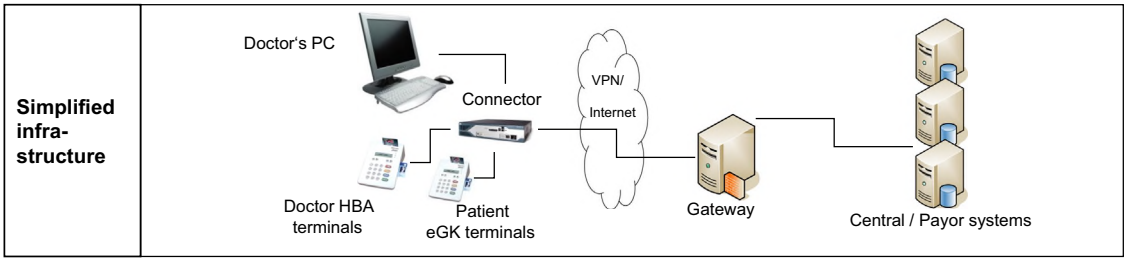

Figure 1 Simplified depiction of 'eGK' technology.

stakeholder model to the interview partners in order to test its conceptual soundness as well as to obtain further information on cross-stakeholder behavior.

Within case analysis was conducted and the final integrative stakeholder model was developed in an iterative process using both the data obtained from the observations and the interviews. This iterative process was conducted in order to allow for modifications and a fair representation of new elements. Data collection ended at the point of redundancy [23]. Through its design in two phases and given the involvement of two researchers in the data collection process we have achieved triangulation of "Data" (in terms of time, space and person), "Methodology" (through the inspection of literature, the 'eGK' implementation project and the conducting of semi-structured interviews) and "Investigator" [24].

We followed Eisenhardt's [25] and Eisenhardt and Graebner's [26] approach to building theory from case studies choosing the qualitative case study format for several reasons: firstly, stakeholder interaction in national eHealth implementation programs is a relatively little-known phenomenon. There is need for a better exploration and deeper understanding. Secondly, qualitative case-based research offers a 'holistic' view on a matter, a realization of the topic under research and an understanding of the dynamics underlying the relationship. During the interview phase, a semi-structured interview process helped guide the conversation in the right direction while also allowing the interview partners to elaborate according to their experience. Thirdly, with the case of the 'eGK' we hope to extend a growing field of research, namely on national eHealth programs. Finally, given that the 'eGK' technology is yet to be fully rolled out it is difficult to collect data from end-users on the success of the implementation process.

Analysis

Although the 'gematik' was set up in 2005, little progress towards rolling out the 'eGK' technology had been made by 2006. The 'gematik' therefore conducted an extensive cost benefit analysis of the technology with the results arguing in favor of substantial cost saving potential, despite high initial costs and a long-term pay-back period exceeding a 10-year timeframe in the current rollout sequence. In 2007, the technology was subsequently tested in field-tests amongst 10,000 patients in six designated areas across Germany where political acceptance was particularly high. However, results did not show the desired outcome in terms of the technological stability, performance and user acceptance. In 2009, the lead association of the payor organizations, 'GKV-SV' (Spitzenverband Bund der Gesetzlichen Krankenkassen) called for a disentanglement of the technical complexity. Finally, since in late 2010 the technology had still not been implemented, the 'GKV-SV' initiated yet another re-evaluation with the aim of introducing a technologically simplified solution. Despite significant efforts, to date this technological solution has not been rolled out. One is left to wonder what has slowed down the planning and implementation process and who, i.e. which stakeholders, are responsible for the prolongation.

To examine this we build on the definition of a 'stakeholder' according to Pouloudi and Whitley [27, p. 2] who "define stakeholders as these participants [individuals, groups or organizations who take part in the development process] together with any other individuals, groups or organizations whose actions can influence or be influenced by the development and use of the system whether directly or indirectly". Figure 2 shows the key stakeholder groups involved in the 'eGK' technology implementation process as identified from the empirical data.

It is important to realize that the various stakeholders' positions had been clear since the initial kick-off of the project in 2005. There had been a strong commitment from the German government changing the law to facilitate the implementation of the 'eGK' technology. At the same time, the 'gematik' maintained close relationships with the Federal Ministry of Health, the Federal Office for Information Security and the Federal Commissioner for Data Protection and Freedom of Information to ensure the official establishment of health-, privacy- and technology-related standards. Also, the roles of payors and providers were well defined by law (Section 291a Abs. 7 Sentence 1, SGB V) allowing for equal participation of both sides in the implementation process. Finally, medical technology providers had for some time been waiting to further invest, implement and roll out partially specified technology.

Notwithstanding this supposedly beneficial establishment of the stakeholders' roles, our data suggests that this very same set-up has caused substantial complications in the implementation process. First of all, important milestones of the implementation project have always been discussed and decided on the national, macro-level. As depicted in Figure 2, decisions have to date been taken on the inner layer, the macro-layer, while the actual benefits of eHealth technologies would mostly surface on the micro and individual layers, i.e. amongst individual doctors, patients and insurance companies. As one interview partner explained:

"In the last ten years, the only touch point between the 'eGK' technology and the doctors and patients has been during the preliminary testing in 2007. Everything else has been discussed on a hypothetical basis."

At the same time however, some doctors and hospitals have long been aware of the benefits of similar technologies as they have begun to connect each others' practices via local eHealth systems in order to continuously improve their treatment offerings.

"One of the reasons why we pushed for yet another re-evaluation of the project as well as the sooner rollout of a simplified version of the 'eGK' technology, was to forestall the implementation of the growing number of competing local systems, which would eventually make the 'eGK' technology obsolete."

Furthermore the governance structure of the 'gematik', providing an equal say to both the payor and provider stakeholder groups, has meant that decisions have always had to be compromises. Such arbitrage seems to be true for all stakeholder groups. Indeed, the empirical evidence suggests that asymmetric motivations of stakeholders both with regards to the implementation process of the 'eGK' technology itself and within the healthcare sector in general lie at the heart of the implementation forestallment. Figure 3 depicts the five key stakeholder groups and sums up the key conflicts between them as extracted from the data.

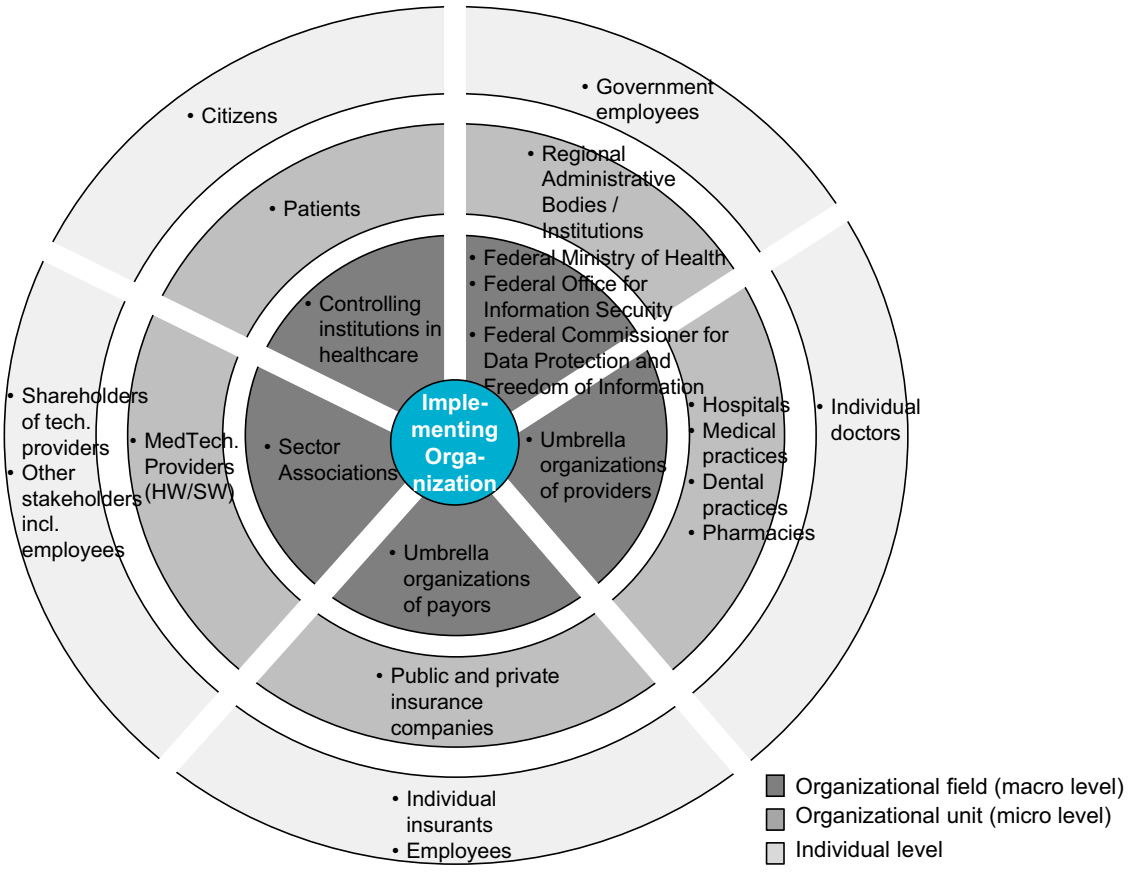

Figure 2 Multilevel stakeholder model.

Within the overall healthcare market, each stakeholder group therefore has their very own objectives and motivations, ranging for example from high quality treatment (doctors and patients) to cost efficiency (payors), see Figure 3. The introduction of a new eHealth system may therefore suit these motivations individually. For example, the 'eGK' technology allows for a more effective treatment of patients through functions such as 'Personal Health Records'. This is in the interest of patients, providers and the government alike. Equally, if implemented as planned, the technology would comply with all privacy laws set out by the government. However, when relating the stakeholders' motivations with one another they can prove to be conflicting. One interview partner explained:

"The diverging motivations become clear when looking at a potential conflict between payors and providers induced by the 'eGK' technology: Payors are generally interested to increase transparency on healthcare delivery as they manage their costs. Providers, however, aim to provide high quality medicine according to their individual knowledge and skills. On the one side, payors wanting to reduce the number of costly treatments might expect doctors to consult electronic data available on the 'eGK' first before conducting their own analyses. Providers, on the other side, might feel that the 'eGK' technology confines them in their freedom to enact their profession."

Our interview partners finally suggested that these asymmetries have lead stakeholder groups to develop hidden agendas beyond the motivations they openly communicate. They pointed out, that different stakeholders have abused open communication channels in order to draw public support.

Discussion of results

The above observations can be summarized by mainly three phenomena which we put into perspective with the current literature on eHealth implementation projects.

Specificity of the eHealth context

We have observed how stakeholder behavior can influence the implementation of a national eHealth program whereby stakeholders act according to their motivations within the overall healthcare market. Conflicting motivations may surface especially when tested in times of change where the introduction of a national eHealth system acts as a catalyst.

This phenomenon is particularly apparent in the context of eHealth where stakeholders can take very extreme stances. Strict regulation with regards to data privacy and data security as well as the payors' tight cost targets are just a couple of reasons recurrently voiced by our interview partners as to why they take such strong positions. Another reason repeatedly mentioned is the historically developed self-conception with which doctors conduct their work. Traditionally and intentionally, doctors have had great scope

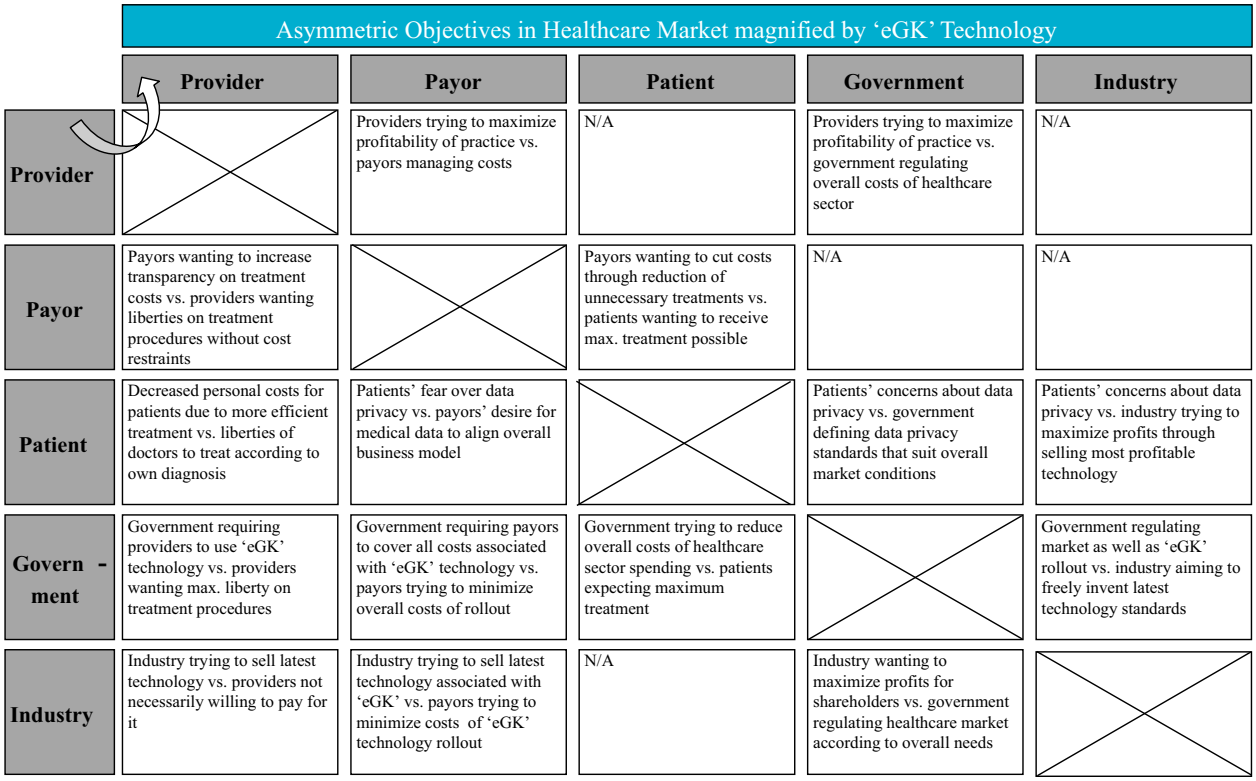

Figure 3 Asymmetric stakeholder objectives.

for discretion in their ways of working, independent of hierarchical controls [4,28]. They might therefore perceive the introduction of the 'eGK' technology as an infringement by the payors, the 'gematik' and the government.

Data privacy

Our data shows that privacy concerns are another reason over which stakeholders take opposing views. This factor has previously been discussed, amongst others by Anderson and Agarwal [3]. Patients and providers might especially be in conflict with payors over data security as medical data are regarded as some of the most sensitive out there.

Overall stakeholder behavior

Within the 33 papers identified on national eHealth programs, five papers particularly discuss stakeholder behavior, while another four also mention this as a critical factor for eHealth implementation [11,15,29,30]:

Aanestad and Jensen [10] look at how far stakeholders have to be mobilized to overcome eHealth implementation challenges. Constantinides and Barrett [12, p. 52] find that "development and use of ICT do not emanate solely through the intentions of a select few individuals, but through an ongoing process of negotiation between multiple actors and their technological choices". Currie and Guah [31] argue that the influence of regulatory, normative and cultural-cognitive factors have to be understood when looking at large-scale government supported IT programs. Puri et al. [14] reason that participatory networks should be created to bring stakeholders together and to achieve common goals. Finally, Currie [5] observes that stakeholders on both the macro- (organizational field) and micro-level (level of organizational unit) are affected by coercive, mimetic and normative pressures as strict, contemporary technical standards are enforced. These pressures can lead to adverse reactions on all levels.

Beyond the 33 papers identified, stakeholder behavior has repeatedly been observed as a key success factor to healthcare technology since the late 1980s [32]. Particularly, Mantzana et al. [33] offer static and dynamic approaches on how to identify stakeholders within healthcare programs classifying them into different categories: acceptors, controllers, supporters and providers. Pouloudi and Whitley [27] identify stakeholders that play a pivotal role in the development of drug use management systems in the UK, emphasizing the complexity of stakeholder constructs.

We agree with these authors on the importance of considering stakeholder behavior in order to fully understand the challenges faced to successful eHealth implementation. We broaden the existing discussion as our approach goes beyond offering a systematic methodology for identifying key stakeholders and proposes an explanation of how asymmetries in stakeholders' motivations affect their behavior. This can, as in the case of the 'eGK' technology, lead to temporary implementation stagnation. We concur with Sahay et al. [15] who argue for the integration of eHealth infrastructures being asymmetric, mirroring an uneven distribution of power and resources amongst stakeholders, as well as with Boonstra et al. [34] who argue that implementation of eHealth technology can prove difficult due to differences on the elements of culture, finance, power as well as the concrete working practices. Our findings take these analyses further to identify varying types of asymmetries according to the stakeholders' motivations.

Limitations and implications for research and practice

We have conducted a single case study on the implementation of the 'eGK' technology in Germany. Caution should therefore be taken when generalizing the findings. Although the majority of the stakeholders identified were also discussed in other studies examined above, the contextual setting of healthcare provision may differ across countries. For example, the general contribution-based financing model of the German healthcare market differs from other countries that are based on tax-payer models. To further validate our stakeholder asymmetry model it would be helpful to test it in the context of other national eHealth programs. We refer to Currie's [5] call for possible cross-case and cross-national analyses.

Besides, a longitudinal study could be of interest once the 'eGK' technology has been successfully adopted. This would allow for the testing of our asymmetry model at a later stage once the 'eGK' technology is fully rolled out and end-users are actually employing it on a daily basis.

Notwithstanding these limitations, by collecting triangulated data over a two-year period our model has considerable theoretical implications for research within this field As such, our model identifies, incorporates and structures relevant stakeholders in eHealth. Similarly to Currie's [5, p. 245] findings, who reasons that one can "gain a greater understanding of the outcome of decisions on large-scale IT change in healthcare if they are framed at the level of organizational field, rather than at the organizational unit of analysis", we argue that national eHealth programs need to be viewed on a macro, micro and individual level. We extend her research by collecting qualitative data on the macro-level and showing the implications that stakeholder behavior at this level can have on the implementation of national eHealth programs.

The implications of our findings therefore also have a number of practical repercussions: Stakeholders involved in national eHealth implementation programs need to understand each other's respective objectives both within the general healthcare market as well as during a potential implementation process. Given the danger of asymmetric stakeholder motivations, one solution might be that governments initially decide on whether to follow a top-down "push" strategy, whereas they fully regulate the rollout by assigning responsibilities and setting strict deadlines. Alternatively, they could to follow a bottom-up "pull" strategy, whereby demand for the technology is created through stakeholders on the individual level, i.e. the doctors and patients. The case of the 'eGK' suggests that end-users can be more successfully incorporated in the implementation process if a "pull" strategy is followed right from the outset. Such measures will help to practically involve stakeholders across all levels moving them away from hypothetical discussions.

Conclusion

Through the collection of substantive qualitative data on the case of the German 'eGK' technology we were able to successfully answer the two questions set at the beginning of our research: for what reasons do national eHealth programs often fall behind and what role do the various stakeholders involved play? As such, the occurrence of conflicting stakeholder motivations across organizational levels can help to explain the failure of national eHealth programs long before they are rolled out to end-users and despite a possible consent on their usefulness. We extend the research on the relatively unexplored field of national eHealth implementation programs taking a decidedly exploratory approach. On the scholarly side, the developed stakeholder model can serve as a starting point for future research on the disentanglement of stakeholder motivations in such large-scale eGovernment programs. On the practical side, we are hopeful it provides guidance to governments and institutions alike on the importance of stakeholder incorporation during the rollout of large-scale eHealth infrastructures.

Author statements

Ethical approval

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Competing interests

None declared.

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