Evidence-Based Health Informatics
E. Ammenwerth and M. Rigby (Eds.)

doi:10.3233/978-1-61499-635-4-53

Understanding Stakeholder Interests and Perspectives in Evaluations of Health IT

Lisa LEE[1,a] and Aziz SHEIKH[a]
[a] *Centre for Medical Informatics, Usher Institute of Population Health Sciences and Informatics, The University of Edinburgh, Medical School, United Kingdom*

Abstract. Appropriately identifying and representing stakeholders' interests and viewpoints in evaluations of health information technology (health IT) is a critical part of ensuring continued progress and innovation in eHealth. This contribution therefore seeks to clarify the principles of stakeholder analysis in an eHealth context. We describe this with reference to a mixed methods national evaluation of ePrescribing systems in English hospitals. We use this evaluation to exemplify the engagement and analytical tools required to ensure a detailed understanding of the issues, challenges and lessons learnt across stakeholder groups. We conclude that this type of approach may support the robustness of evaluations of health IT as well as their longer term impact on innovation in the field.

Keywords. Evaluation, health information technology, stakeholders.

1. Introduction

Stakeholder analysis, which includes identifying stakeholders and their interests and perspectives, is essential to ensuring a robust health IT evaluation in what are often the unpredictable political contexts in which health IT programmes occur. It is not uncommon for such programmes to repeatedly encounter delays and resistance before any anticipated positive outcomes can be measured [1] making it difficult to produce outcome-based evidence. More specifically health IT projects are often upstream interventions with relatively diffuse effects, which are difficult to measure [2].

Yet underlying the questions of measurement, analysis and application of health IT evaluations, we find a more fundamental, albeit complex, set of issues in relation to how we define stakeholder boundaries of participation, how individual and collective views can be brought together systematically and meaningfully to ensure a robust evaluation, and how this knowledge can be translated and applied to support optimal use of health IT.

Stakeholders in such evaluations may be broadly defined as those involved directly and indirectly in the production and use of health IT at every level. Applying this lens allows us therefore to formulate a simplified analytical framework with two major groups of actors: *producers* – seen as those involved in creating the appropriate contexts and products for the deployment of health IT (e.g., policy makers, software developers); and *users*, who can be seen as those making direct use of health IT (i.e.

[1] Corresponding author: Dr. Lisa Lee, Centre for Medical Informatics, Usher Institute of Population Health Sciences and Informatics, The University of Edinburgh, Medical School, Teviot Place, Edinburgh EH8 9AG, United Kingdom, Lisa.Lee@ed.ac.uk.

end-users), as well as those who derive value or who are expected to benefit from its use (e.g. healthcare organisations, patients, and so on).

The multiple perspectives these stakeholders represent [3] and the degree of influence they may exert [4] result in complex stakeholder structures [1]. Added to this, the relational quality in terms of the purpose, values, needs and interests of stakeholders at key stages in the development, adoption and use of health IT can make the position of individual stakeholder groups both complex and fluid. This, in turn, can make defining the problems and solutions to system adoptions and use [5] challenging, and can risk leading to unsatisfactory recommendations for best practice.

The crux of the issue in this type of work therefore is ensuring that the evaluation of multiple stakeholders involves three steps – collating evidence from different stakeholders; analysing and interpreting this information, which by necessity will include comparing and contrasting evidence, and responding appropriately to this by striking an appropriate balance between maximising benefits of health ITs and minimising adverse effects for as many stakeholders as possible.

To explore this in more detail we have organised the contribution into three core areas:

(1) The principles of stakeholder analysis and the range of stakeholders in health IT initiatives, such as purchasers, vendors, professionals, patients, and data warehousing and analytics firms.
(2) Methods of stakeholder analysis, and how tensions may result from the complex relationships between actors, divergences in their goals and viewpoints, and how these may be addressed in practice.
(3) Critical walk-through of a national evaluation [6] of hospital ePrescribing systems in England.

2. Principles of stakeholder analysis

It is now well established that the adoption and use of technology involves multiple social processes and unexpected consequences [7-9] on working practices resulting in workarounds or ad-hoc local usage policies and practices that shape new technologies beyond the point of production or market availability. This complex and multifaceted feature of eHealth innovation [4] has led to calls for a more holistic approach [10] to the evaluation and deployment of eHealth technologies in order to improve stakeholder engagement, participatory design and the interconnectedness of all those involved [11]. As such, stakeholder analysis is seen to help support a good 'fit' [10] between the technology and the environment in which it is used, by facilitating incremental improvements to the system over time as use may be optimised [12].

There are a number of key principles of stakeholder analysis which need to be considered at the outset [13] such as: What is the purpose of the analysis? At what stage is it occurring? What aspect(s) are being focused on? What resources are available to carry out the analysis? What is the timeframe?

Clearly decisions on these key aspects of the analysis will impact upon the results. For instance, an analysis occurring over extended timeframes [8] [14] will ensure that stakeholders are accounted for from the point of design right through to primary and secondary uses of the technology, yet may be unable to provide the level of detail required to understand a specific aspect of the deployment. These parameters need to be therefore determined at the point of inception of the evaluation and according to the

evidence required. Notwithstanding these dimensions, a stakeholder analysis needs to be clear about the actors involved and the perspectives they represent. Thus understanding stakeholders' areas of influence, their expectations and goals, are vital since these are seen as determinants in the outcome of health IT adoption [15]. To aid in this process, we suggest that a typology of actors, such as the one presented below, may provide a useful starting point to explore and map stakeholders and their perspectives.

The simplified schema of stakeholders presented in Figure 1 illustrates a number of key points. Firstly, it demonstrates that there may an overlap between areas of influence and priority, even within a single stakeholder entity. By way of example, we may consider an organisation responsible for the delivery of healthcare nationally, such as National Health Service (NHS) England. Within the producer-user schema, the NHS may be seen as both the producer of an appropriate context of use (through for instance localised policies), as well as being the user of health IT systems, since it is involved in the procurement of the technologies it seeks to deploy.

Such overlaps as well as the distinct goals and expectations of individual stakeholders may result in multiple perspectives and agendas being held within or on behalf of a single organisation. This is perhaps what typified the introduction of Electronic Health Records as part of the National Programme for IT in England, where problems emerged from centrally negotiated contracts on behalf on individual hospitals [1] and therefore ultimately end-users.

In practice, this may translate into tensions between stakeholders and divergences of expectations with potentially disastrous implications for the engagement of end-users [8] and the success of the health IT implementation as a whole. In this respect it is important to ensure there is a detailed breakdown of individual user groups. For instance, even within a single health IT system, there will be divergences and conflicts of viewpoints resulting from the functionalities used within the system and individual professional tasks, so that the perspectives of each professional group may vary as each is may be affected differently by use of the system.

Addressing these tensions is of course an important aspect of the stakeholder analysis. They may be used to both flag up alarm points or areas where additional resources and support may be required to ensure successful system adoption, or where further evaluation and monitoring may be required to assess whether the tensions and conflicts are temporal or likely to be recurring long standing issues.

Stakeholder perspectives therefore need to be considered within a framework in which it becomes possible to disentangle the complex and fluid relationships between actors, the changing nature of the relationships and the environments in which health IT systems are deployed over time [16] as well as the evolving technologies and innovation shifts that occur [17]. In this respect, it is helpful to consider within a health IT evaluation how stakeholders' presence may be mapped and therefore selected over the lifecycle [8] of the technology from project initiation right through to deployment and beyond (which includes system optimisation and secondary data use).

In short a stakeholder analysis needs to reflect the 'social multidimensionality' [18] in which technological appropriation takes place within different institutional contexts. It is these changing contexts of use and interests that for many stakeholders bring about contradictions between the organisational culture to which they may belong and the parameters and resources provided by other stakeholders to which they have to conform, even if reluctantly [18].

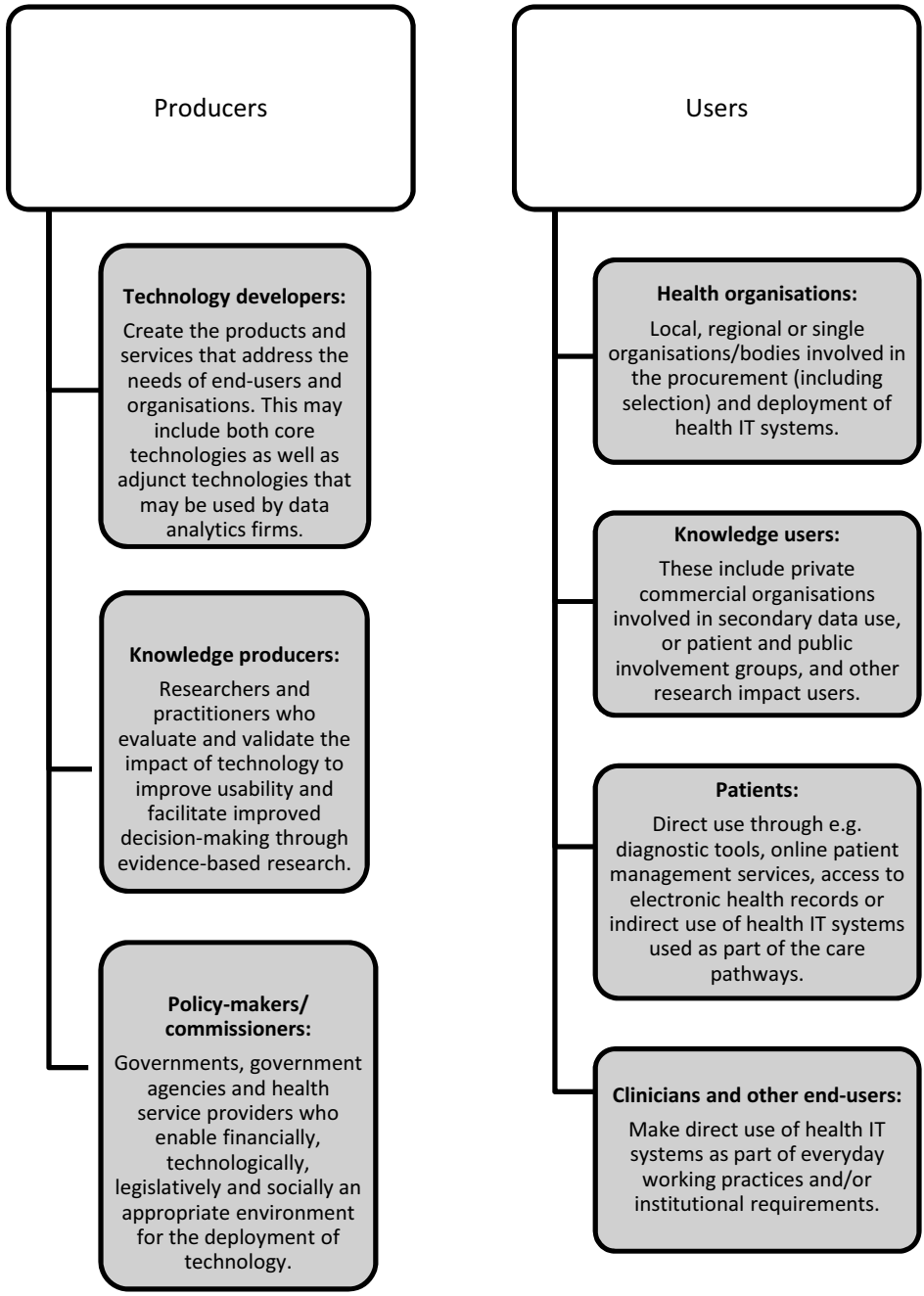

Figure 1. Simplified typology of stakeholders.

The implications for those involved in applying stakeholder analyses for the evaluation of health IT are clear from a methodological point of view: there is a need for flexible, consistent and sufficiently broad ranging evaluation tools that enable these multiple, changing and conflicting views to be both evaluated and brought together. Below, we consider in more detail how this may be achieved in practice.

3. Methods of stakeholder analysis

Methodologies in the evaluation of health IT systems have come under ever closer scrutiny [1, 4, 9-10, 19] and have led to calls to address their shortcomings [19] through more holistic models [10] that enable socio-technical factors [12, 20][2] and multiple perspectives to be concurrently evaluated [5]. While quantitative measurements remain a central aspect of health IT evaluations, user-centred bottom-up approaches which can usefully be combined with top-down quantitative approaches offer the flexibility required to include the divergent perspectives of different stakeholders, and ensure a fuller understanding [14] in terms of which individual areas may result in positive, negative or neutral outcomes for instance in terms of levels of implementation and adoption [21].

In other words, there is a need for different perspectives to be explored to understand the impact of an intervention, by reflecting how each stakeholder is affected, why, and what variables need to be changed or adapted in order to improve outcomes. The richness and detail of the qualitative data become especially significant in the era of big data, or when anonymous automated reporting is available within a health IT system, as they provide the necessary contextual evidence while remaining cost-effective [7].

A review of key strategies for the evaluation of eHealth undertaken to date [10] clearly shows the multiple axioms along which health IT evaluations have been designed to capture a wide variety of stakeholder perspectives and views. As suggested earlier on in this contribution, a number of considerations need to be made both at theoretical and empirical levels to align the design of the evaluation with its intended outcomes, as this will support the robustness of the stakeholder analysis.

The evaluation of health IT by means of stakeholder analysis will need to consider first the perspectives that are being captured and analyzed, including whether the analysis is user-centered, multi-faceted and/or multidisciplinary. Weight will also need to be given to contextual factors and frameworks, including legislative, commercial, economic, or socio-technical. The timescales of the evaluation will also be a determinant of the outcome of the stakeholder analysis as views, perspectives and interests may change over time. Therefore whether the analysis is continuous, iterative or phased, will constitute an additional methodological consideration. Finally, special attention needs to be given to ensuring on which aspects of a health IT deployment or adoption are stakeholders' perspectives being sought and what benchmarks are being used to define their perspectives, including whether stakeholders views and interests relate to structure, process, outcomes, procedures, performance or a combination of these.

[2] See also: B. Kaplan, Evaluation of people and organizational Issues – Sociotechnical ethnographic evaluation, in: E. Ammenwerth, M. Rigby (eds.), Evidence-Based Health Informatics, Stud Health Technol Inform 222, IOS Press, Amsterdam, 2016.

With all this in mind, it will become easier to define the appropriate methodological evaluation approaches, such as quantitative clinical trials, qualitative case studies or in larger studies, mixed methods that are able to offer a combination of approaches.

4. Example: Evaluation of ePrescribing in England

The UK's National Institute for Health Research (NIHR) funded evaluation of ePrescribing in England [6] provides a good illustration of the principles and methodological considerations of stakeholder analysis discussed so far, including (1) appropriate mapping of stakeholders and their changing interests and viewpoints over time, and (2) methodological approaches that ensure the ability to capture and triangulate stakeholder perspectives, and to engage with the stakeholder-base as part of the research process. Below we provide a critical walk through how each of these areas has been addressed in this national evaluation of ePrescribing.

4.1. ePrescribing stakeholders

The national ePrescribing evaluation highlights not only the multiple actors involved in large scale health IT deployments but also how their expectations and interests can be brought together in an attempt to find resolutions to any conflicts and divergences.

The stakeholder-base involved in the implementation and adoption of ePrescribing systems that offer varying degrees of functionality in the supply, administration, recording and ePrescribing of medication [22] is wide-ranging and includes both producers and users of technology, as discussed earlier. The evaluation has therefore sought to capture the perspectives of: physicians, nurses, pharmacists, and other healthcare professionals; health IT suppliers; patients and carers; policy-makers; hospital managers, IT and finance teams. It has done so by collecting qualitative interview data from key stakeholders, including end-users in case study hospitals before as well as three to six months post-implementation, and again once the system might be considered embedded. This has enabled a longer-term perspective on the introduction and use of ePrescribing systems in English hospitals to be taken in order to take into account evolving situations and to assess how changes that happen over time may impact on stakeholder perspectives [8].

Many eHealth implementations are tainted, especially in immature digital markets [12] with unrealistic and wide-ranging expectations that have adverse effects on engagement [12,14,23-26] which may provide falsely negative stakeholder perspectives for instance if the system is considered having few benefits, when problems may in fact be the result of lack of readiness.

The collation of detailed case studies of hospitals deploying ePrescribing systems with different functionalities, at different stages of deployment and adoption, and in different geographical regions, has allowed therefore for cross-comparisons and disconfirming searches to help understand divergences and similarities between sites. This strategic selection of case studies has provided an opportunity to balance stakeholder perspectives and conflicting views when developing recommendations for best practice. This type of approach further allows the narrative behind the introduction and adoption of ePrescribing to be meaningfully applied throughout the lifecycle of the

system [8] and to establish when behaviour, events or technical issues are transient, and where results suggest a longer term effect. This longer-term perspective is seen as especially critical in the context of an immature product, such as ePrescribing, which will be shaped by its users and the context within which it is being used.[3]

4.2. Mixed methods for robustness of stakeholder analysis

While the ability to capture and contrast stakeholder perspectives over time was in the ePrescribing evaluation achieved by means of qualitative case studies, robustness of the stakeholder analysis has been enhanced through the use of mixed methods [4] which provide complementary stakeholder perspectives at key stages [27] along the system development and care pathways (supplier, NHS organisation, patients).

This mixed method approach has provided measurements in various forms of the anticipated benefits of ePrescribing, by looking both qualitatively and quantitatively at safety and error rates [28], efficiency and cost benefit [2] and communication [12, 25, 29].

It is important to note also how the perspectives of patients – a key yet often neglected stakeholder group – has been facilitated through the inclusion of a Patient and Public Involvement Group throughout the evaluation to influence and challenge perspectives individually and collectively at each stage of the research. Importantly, these research strategies and tools, as well as the findings being generated from them, have been used to engage and inform stakeholders via an online toolkit www.ePrescribingtoolkit.com [30]. This provides not only engagement but also an alignment of the goals of stakeholders by supporting and promoting successful implementation strategies that draw on evidence-based research.

Findings from the stakeholder analysis can thereby remain both reflective and outwardly engaging towards ePrescribing stakeholder communities, whether they be commercial players, policy-makers, health organisations or clinicians as well as patients themselves, and may help unpick the complex relationships between stakeholders [13] at critical stages in the health IT systems' adoption [27]. The toolkit alongside various closed and open stakeholder events organised as part of the evaluation [31] have moved the analysis beyond identifying its stakeholder-base and a description of their perspectives, to an active form of participation in the research as stakeholders are both subjects and users of the research, thus allowing knowledge derived from the analysis to be applied meaningfully.

5. Conclusions

It is worth remembering that while we advocate the use of a stakeholder analysis that enables as many perspectives as possible to be considered over extended timeframes and at different stages of health IT deployments, practical considerations such as costs,

[3] For further discussions of evaluating health IT for medication safety, see: H. Seidling et al., Evaluating the impact of health IT for medication safety, in: E. Ammenwerth, M. Rigby (eds.), Evidence-Based Health Informatics, Stud Health Technol Inform 222, IOS Press, Amsterdam, 2016.

[4] See also: P.J. Scott et al., Mixed methods: a paradigm for holistic evaluation of health information system, in: ibid.

resources, expertise and so on, do need to be taken into account and compromises will need to be made where necessary.

In the context of the ePrescribing evaluation, this included the strategic selection of case study sites which hold particular known characteristics to enable a good balance between reliability and efficiency of data collection, attaching local researchers to individual sites as well as collaborative modalities of data collection at each site, for instance when ward pharmacists collected quantitative data on error rates as part of daily ward rounds.

While the complexity of the stakeholder relationships and the reconciliation of their perspectives to help foster technological usability, innovation and participation may be addressed through integrated methodological approaches [19, 32-33] and transdisciplinary collaboration [5,9] stakeholder analyses are far from straightforward [19]. A number of steps may help address the difficulties encountered.

Firstly, ensuring the timing of the analysis is appropriate enables the evolving nature of health IT [12] and its diffuse effects [2] to be considered. Secondly, when wide ranging issues from usability and design, staff training, increased time required to perform clinical duties, or the impact of eHealth systems on face-to-face interactions between patients and Health Care Professionals are flagged up during the analysis, it is vital to support appropriate utilisation of this knowledge [34] to address the translational gap in its application [35]. A stakeholder analysis which is being used as part of a health IT evaluation needs to consider fully therefore how best to manage findings [36] to allow stakeholders appropriately to plan, implement and make optimal use of this knowledge when expertise of eHealth system implementations and adoption is limited [30, 37]. This will help address challenges posed by conflicting stakeholder perspectives, such as when interventions are viewed positively by patients, but are found to be ineffective or not cost-effective in the analysis. Finally, it is worth noting that variations globally in how healthcare technologies may be adopted are significant for the applicability of a stakeholder analysis. Indeed local norms may affect the usefulness of a stakeholder analysis [13]. As such it is important to be mindful both of the feasibility and usefulness of seeking multiple stakeholder perspectives in particular geographical settings globally with distinct organisational cultures.

The points we have made throughout this contribution should be a stark reminder to both policy makers and researchers in the field that health IT evaluations do need appropriate time, methodological approaches, resources and expertise if they are to fulfil their objective.

Acknowledgement

The ePrescribing Programme is funded by the National Institute for Health Research's Programme Grants for Applied Research.

Recommended further reading

1. R. Brugha, Z. Varvasovszky, Stakeholder analysis: a review, *Health Policy and Planning* **15**(3) (2000), 239-246.

Food for thought

1. What are the key ways in which the complex stakeholders' perspectives can be evaluated?
2. How can knowledge transfer be used to help balance stakeholder perspectives in the evaluation?
3. What issues might arise in the evaluation of health IT systems across organisational cultures or geographical settings?

References

[1] P. Klöcker, R. Bernnat, D.J.Veit, Stakeholder behavior in national eHealth implementation programs, *Health Policy and Technology* **4**(2) (2015), 113-120.

[2] R. Lilford, A. Girling, A. Sheikh, J. Coleman, P. Chilton, S. Burn, D. Jenkinson, L. Blake, K. Hemming, Protocol for evaluation of the cost-effectiveness of ePrescribing systems and candidate prototype for other related health information technologies, *BMC Health Services Research* **14** (2014), 314.

[3] D. Ahern, J. Kreslake, J. Phalen, What Is eHealth? Perspectives on the Evolution of eHealth Research, *J Med Internet Res* **8**(1) (2006):e4.

[4] L. Catwell, A. Sheikh, Evaluating eHealth Interventions: The Need for Continuous Systemic Evaluation, *PLoS Med* **6**(8) (2009): e1000126.

[5] L. Catwell, A. Sheikh, Information Technology (IT) users must be allowed to decide on the future direction of major national IT initiatives. But the task of redistributing power equally among stakeholders will not be an easy one, *Informatics in Primary Care* **17**(1) (2009), 1-4.

[6] ePrescribing Programme, *NIHR ePrescribing Programme: Overview*, http://www.cphs.mvm.ed.ac.uk/projects/eprescribing, last access 11 February 2016.

[7] I. Savage, T. Cornford, E. Klecun, N. Barber, S. Clifford, B. Franklin, Medication errors with electronic prescribing (eP): Two views of the same picture, *BMC Health Serv Res* **10** (2010), 135.

[8] K. Cresswell, D. Bates, Sheikh. A, Ten key considerations for the successful implementation and adoption large-scale health information technology, *J Am Med Inform Assoc* **20**(e1) (2013), e9-13.

[9] C. Pagliari, Design and evaluation in eHealth: Challenges and implications for an interdisciplinary field, *J Med Internet Res* **9**(2) (2007).

[10] J. Van Gemert-Pijnen, N. Nijland, M. Van Limburg, H. Ossebaard, S. Kelders, G. Eysenbach, S. Erwin, A Holistic Framework to Improve the Uptake and Impact of eHealth Technologies, *J Med Internet Res* **13**(4) (2011).

[11] M. Yusof, J. Kuljis, A. Papazafeiropoulou, L. Stergioulas, An evaluation framework for Health Information Systems: human, organization and technology-fit factors, *Int J Med Inform* **77**(6) (2008), 386-398.

[12] K. Cresswell, D. Bates, R. Williams, Z. Morrison, A. Slee, J. Coleman, A. Sheikh, Evaluation of medium-term consequences of implementing commercial computerized physician order entry and clinical decision support ePrescribing systems in two 'early adopter'hospitals, *J Am Med Inform Assoc* **21**(e2) (2014), e194-202.

[13] R. Brugha, Z. Varvasovszky, Stakeholder analysis: a review, *Health Policy and Planning,* **15**(3) (2000), 239-246.

[14] T. Greenhalgh, J. Russell, R. Ashcroft, P. Parsons, Why National eHealth Programs Need Dead Philosophers: Wittgensteinian Reflections on Policymakers' Reluctance to Learn from History, *Milbank Quarterly* **89**(4) (2011), 533–563.

[15] T. Ingebrigtsen, A. Georgiou, R. Clay-Williams et al., The impact of clinical leadership on health information technology adoption: Systematic review, *Int J Med Inform* **83** (2014), 393-405.

[16] S. Bullas, J. Bryant, Complexity and its Implications for Health Systems Implementation, in *Information Technology in Health Care*, IOS Press Amsterdam, 2007, pp. 37-44.

[17] M. Grisot, P. Vassilakopoulou, Infrastructures in healthcare: The interplay between generativity and standardization, *International Journal of Medical Informatics* **82**(5) (2013), 170-9.

[18] A. Boonstra, M. Van Offenbeek, Towards consistent modes of e-health implementation: structurational analysis of a telecare programme's limited success, *Info Systems Journal* **20**(6) (2010), 537-561.

[19] A. Ekeland, A. Bowes, S. Flottorp, Methodologies for assessing telemedicine: A systematic review of reviews, *Int J Med Inf* **81**(1) (2011), 1-11.
[20] L. Novak, R. A. S. Holden, J. Hong, B. Karsh, Using a sociotechnical framework to understand adaptations in health IT implementation, *Int J Med Inform* **82**(12) (2013), e331-44.
[21] A. Jha, D. Doolan, D. Grandt, T. Scott, D. Bates, The use of health information technology in seven nations, *Int J Med Inform* **77** (2008), 848–854.
[22] S. Goundrey-Smith, *Principles of Electronic Prescribing*, Springer-Verlag, London, 2012.
[23] A. Takian, D. Petrakaki, T. Cornford, A. Sheikh, N. Barber, Building a house on shifting sand: methodological considerations when evaluating the implementation and adoption of national electronic health record systems, *BMC Health Services Research* **12** (2014), 105.
[24] K. Cresswell, A. Slee, J. Coleman, R. Williams, D. Bates, A. Sheikh, Qualitative Analysis of Round-Table Discussions on the Business Case and Procurement Challenges for Hospital Electronic EPrescribing Systems, *PLoS ONE* **8**(11) (2013), e79394.
[25] A. Sheikh, T. Cornford, N. Barber et al., Implementation and adoption of nationwide electronic health records in secondary care in England: final qualitative results from a prospective national evaluation in 'early adopter' hospitals, *BMJ* **343** (2011), d6054.
[26] A. Robertson, K. Cresswell, A. Takian et al., Implementation and adoption of nationwide electronic health records in secondary care in England: qualitative analysis of interim results from a prospective national evaluation, *BMJ* **341** (2010), c4564.
[27] K. Cresswell, J. Coleman, A. Slee et al., A toolkit to support the implementation of electronic ePrescribing systems into UK hospitals: preliminary recommendations, *J R Soc Med* **107**(1) (2014), 8-13.
[28] S. Thomas, S. McDowell, J. Hodson, U. Nwulu, R. Howard, A. Avery, A. Slee, J. Coleman, Developing consensus on hospital ePrescribing indicators of potential harms amenable to decision support, *Br J Clin Pharmacol* **76**(5) (2013), 797–809.
[29] J. Hendy, N. Fulop, B. Reeves, A. Hutchings, S. Collin, Implementing the NHS information technology programme: qualitative study of progress in acute trusts, *BMJ* **334**(7608) (2007), 1360-1364.
[30] L. Lee, K. Cresswell, A. Slee et al., Using stakeholder perspectives to develop an ePrescribing toolkit for NHS Hospitals: a questionnaire study, *JRSM Open* **5**(10) (2014),1-9.
[31] NIHR ePrescribing Programme, *Past Conferences and Events*, http://www.cphs.mvm.ed.ac.uk/projects/eprescribing/pastevents.html, last access 11 February 2016.
[32] D. Carr, A. Howells, M. Chang, H. N, E. A. N, An integrated approach to stakeholder engagement, *Healthc Q* **12**, (2009), 62-70.
[33] K. Unertl, B. Johnson, C. Gadd, N. Lorenzi, Bridging Organizational Divides in Health Care: An Ecological View of Health Information Exchange, *JMIR Medical Informatics* **1**(1) (2013).
[34] H. Länsisalmi, M. Kivimäki, M. Elovainio, Is underutilization of knowledge, skills, and abilities a major barrier to innovation? *Psychol Rep* **94** (2004), 739-50.
[35] A. MacFarlane, P. Clerkin, E. Murray et al., The e-health implementation toolkit: qualitative evaluation across four European countries, *Implement Sci* **6**(122) (2011).
[36] J. Wyatt, Management of Explicit and Tacit Knowledge, *J R Soc Med* **94** (2001), 6-9.
[37] E. Murray, C. May, F. Mair, Development and formative evaluation of the e-Health Implementation Toolkit (e-HIT), *BMC Med Inform Decis Mak* **10**(61) (2010).