

## GUEST EDITORIAL PREFACE

# Special Issue on Theory Driven Interventions Are We Looking at Social and Organizational Aspects of Health Care Technology in the Field of Medical Informatics?

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Information Systems (IS) research has highlighted that Information Technology implementation is a socio-technical phenomena, where social and organizational challenges often result in implementation failure. Medical informatics (MI) is broadly the core field where discussions of healthcare technology are happening. Many researchers have over the years suggested useful learnings from IS into MI (Lorenzi et al., 1996; Anderson & Aydin, 2005), which might help avoid implementation failures (Heeks, 2006). Our special issue on Theory-Driven Interventions, brings together three papers that highlight social and organizational aspects of health information systems implementation from a theory-driven perspective.

Theory-driven evaluation came to prominence only a few decades ago with the appearance of Chen's 1990 book *Theory-Driven*

*Evaluations*. Since that time, the approach has attracted many supporters as well as detractors. At its core, theory-driven evaluation has two vital components. The first is conceptual, the second empirical (Rogers et al., 2000). Conceptually, theory-driven evaluations should explicate a program theory or model. Empirically, theory-driven evaluations seek to investigate how programs cause intended or observed outcomes (Coryn et al., 2011). Such efforts have resulted in a new paradigm of medical interventions, called Implementation Science (Padian et al., 2011; WHO, 2012; Dodds et al., 2013) including an open-access journal called Implementation Science published by BioMed Central since 2006. We see more and more activities from global aid agencies focus, that much of a health programme's potential outcomes should be theory-based, extracted from exist-

ing social-science theory and the programme models that indicate how each programme is supposed to work (Chen, 2003). This special issue adds to this body of literature, but in the domain of medical informatics.

One of our goals with the special issue was to look at theories, primarily from the domain of Information Systems (IS) that are used in the field of Medical Informatics (MI). Chiasson et al. (2007) highlighted that expanding multidisciplinary approach to MI can offer increased awareness to social and organizational facets of health information technology (HIT). We also see that programme theory can strengthen research protocol and intervention design within an RCT framework (Blamey et al., 2013). Actor-Network Theory, for example, has been used in health services research (Cresswell et al., 2010), but less so in medical informatics, which is one of the target audience of the International Journal of User-driven Healthcare (IJUDH). A look at the top 3 journals according to Google Scholar Metrics for 2012 in MI - Journal of the American Medical Informatics Association, Journal of Medical Internet Research and International Journal of Medical Informatics - highlights the lack of social or organizational perspective in HIT implementations. Social or Organizational factors have been associated with successful implementations, yet few studies look at these factors (Cresswell et al., 2013).

Yet, limiting theory to evaluations is somewhat futile because there is often some theory and based on it, “a hypothesis”, (unless the research is using grounded approach), which drives interventions in the first place. Take the Millennium Development Goals (MDGs) as a case in point. Health Information Systems can provide information about health system performance with respect to several of these goals and thus the vast literature that has emerged around these central development goals over the last decade can drive the implementation of such systems. Some IS interventions look at institutional theory for guidance on interventions towards institutionalization of activities. Other projects may draw on structuration theory and consider existing or evolving structures to be core to their interventions. There is a range

of theoretical lenses that can be deployed to inform interventions, and in this issue we showcase three papers that discuss interventions that are driven by theory – in planning, in action, in diagnosis and in evaluations. The term “theory-driven interventions” is used here to distinguish these from report-style papers, position papers or studies that draw concepts purely from observations without a theoretical basis prior to the intervention.

The case analyzed by Manda and Sanner demonstrates the importance of seeing mHealth interventions as part of an existing Information Infrastructure rather than as stand-alone projects. They show how such a perspective can inform an intervention and enable richer analysis by drawing on the literature on bootstrapping strategies to drive the design and implementation of an open-source mHealth intervention in Malawi, for example when it comes to building on the installed base of technological and organizational capabilities. However, they also illustrate the challenges involved in applying such a perspective, and highlight the cost of coordination between stakeholders, and furthermore, the fact that most likely not all implementation factors can be controlled and reconciled.

Similar attention to the implementation environment is stressed by Hewapathirana and Jayasinghe. They examine attempts at implementing two free and open source software systems in the Sri Lankan health sector environment, one very successful and the other less so. Taking inter-organizational trust in network setups as a key concept, the authors pay special attention to the normative implementation environment and link the differing outcomes to the degree of trust. They also cite the literature on the importance of mediators between open-source developers and healthcare organizations and highlight the presence or lack of boundary-spanning agents as an explanatory variable, while pointing to the need for implementation teams who have frequent interaction with users.

Finally, in their contribution to the special issue, Deussom, Mitchell and Ruben point out that progress towards the Millennium Develop-

ment Goal on improving maternal health has been slow, highlighting the need for a comprehensive and theory based approach. They describe an open-source mHealth intervention that targeted traditional birth attendants to address the underlying causes of the three types of delays that hinder facility-based delivery as outlined in a well-known theoretical framework. The theory-driven intervention was highly successful and resulted in a facility-based delivery rate of well over double the regional average. This was achieved through personalized messages to support decisions, enhancing the role of traditional birth attendants and their link with the formal health care system, and innovative use of contact numbers and mobile banking in the provisioning of transportation. In this case, the theoretical framework allowed the researchers to make use of a common mHealth infrastructure in the form of Java-enabled phones to design an intervention which addressed several aspects of the problem and multiple stakeholders at once.

A commonality in all three studies is the highlighting of issues involved in the accommodation of open-source IS solutions within the complex health field, which inevitably involves a number of decision-makers and stakeholders, both centrally and locally. Together, they show how IS theory can be leveraged to analyse medical informatics interventions. They focus on doing HIS interventions with a theory in mind or with knowledge building/testing in mind and illustrate the utility of applying existing abstracted knowledge (theory) and consider appropriate theoretical lenses when initiating, carrying out and evaluating such interventions. A unifying theme is how interventions informed by theory can contribute to making sense of the complex environment within which HIS interventions take place.

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## REFERENCES

- Anderson, J., & Aydin, C. (2005). Overview: Theoretical perspectives and methodologies for the evaluation of healthcare information systems. In J. Anderson & C. Aydin (Eds.), *Evaluating the organizational impact of healthcare information systems* (pp. 5–29). Springer New York. Retrieved from [http://dx.doi.org/doi:10.1007/0-387-30329-4\\_1](http://dx.doi.org/doi:10.1007/0-387-30329-4_1)
- Blamey, A. A. M., MacMillan, F., Fitzsimons, C. F., Shaw, R., & Mutrie, N. (2013). Using programme theory to strengthen research protocol and intervention design within an RCT of a walking intervention. *Evaluation, 19*(1), 5–23. doi:10.1177/1356389012470681
- Chen, H. (2003). Theory-driven approach for facilitation of planning health promotion or other programs. *The Canadian Journal of Program Evaluation, 18*(2), 91–114.
- Chen, H. T. (1990). *Theory-driven evaluations*. Sage Publications, Incorporated.
- Chiasson, M., Reddy, M., Kaplan, B., & Davidson, E. (2007). Expanding multi-disciplinary approaches to healthcare information technologies: What does information systems offer medical informatics? *International Journal of Medical Informatics, 76*(Supp. 1), S89–S97. doi:10.1016/j.ijmedinf.2006.05.010 PMID:16769245
- Coryn, C. L. S., Noakes, L. A., Westine, C. D., & Schröter, D. C. (2011). A systematic review of theory-driven evaluation practice from 1990 to 2009. *The American Journal of Evaluation, 32*(2), 199–226. doi:10.1177/1098214010389321
- Cresswell, K. M., Bates, D. W., & Sheikh, A. (2013). Ten key considerations for the successful implementation and adoption of large-scale health information technology. *Journal of the American Medical Informatics Association, 20*(e1), e9–e13. doi:10.1136/amiajnl-2013-001684 PMID:23599226
- Cresswell, K. M., Worth, A., & Sheikh, A. (2010). Actor-Network Theory and its role in understanding the implementation of information technology developments in healthcare. *BMC Medical Informatics and Decision Making, 10*(1), 67. doi:10.1186/1472-6947-10-67 PMID:21040575
- Dodds, S. E., Herman, P. M., Sechrest, L., Abraham, I., Logue, M. D., & Grizzle, A. L. (2013). ... Maizes, V. H. (2013). When a whole practice model is the intervention: Developing fidelity evaluation components using program theory-driven science for an integrative medicine primary care clinic. *Evidence-Based Complementary and Alternative Medicine, 2013*. doi:10.1155/2013/652047 PMID:24371464

Heeks, R. (2006). Health information systems: Failure, success and improvisation. *International Journal of Medical Informatics*, 75(2), 125–137. doi:10.1016/j.ijmedinf.2005.07.024 PMID:16112893

Lorenzi, N. M., Riley, R. T., Blyth, A. J. C., Southon, G., & Dixon, B. J. (1997). Antecedents of the people and organizational aspects of medical informatics review of the literature. *Journal of the American Medical Informatics Association*, 4(2), 79–93. doi:10.1136/jamia.1997.0040079 PMID:9067874

Padian, N. S., Holmes, C. B., McCoy, S. I., Lyerla, R., Bouey, P. D., & Goosby, E. P. (2011). Implementation science for the US President's emergency plan for AIDS relief (PEPFAR). *Journal of Acquired Immune Deficiency Syndromes*, 56(3), 199–203. doi:10.1097/QAI.0b013e31820bb448 PMID:21239991

Rogers, P. J., Petrosino, A., Huebner, T. A., & Hacs, T. A. (2000). Program theory evaluation: Practice, promise, and problems. *New Directions for Evaluation*, (87): 5–13. doi:10.1002/ev.1177

WHO. (2011). *Implementation research for the control of infectious diseases of poverty*. Retrieved December 20, 2013, from [http://www.who.int/tdr/publications/tdr-research-publications/access\\_report/en/](http://www.who.int/tdr/publications/tdr-research-publications/access_report/en/)