TDT4900

Kenneth Børtveit

June 27, 2014

Abstract

Acknowledgments

Contents

List of Figures

List of Tables

List of Abbreviations

AD Anno Domini. 37

ANC Antenatal Care. 54

BC Before Christ. 37

BPM Business Process Model. 61, 62

CDSS Computerised Decision Support Systems. 19

CHD Community Health Desk. 52, 55, 57, 58, 61, 62, 79

CHW Community Health Worker. 7, 8, 43, 52–55, 57–62, 64, 65, 68, 69, 73, 75, 81, 82

CoIA Commission on Information and Accountability. 39

CLMIS Community Logistics Management Information System. 57, 58, 60, 67, 71, 73, 80

CPOE Computerized Provider Order Entry. 18

DHIS2 District Health Information System 2. 39, 41, 42, 44, 46, 47, 57, 58, 69, 71, 72, 76, 79, 81, 82

DOT directly observed treatment. 53

DRC Democratic Republic of Congo. 38, 48

ELMIS Electronic Logistics Management Information System. 58

EHR Electronic Health Records. 17, 18

GIS Geographic Information System. 46

GNI Gross National Income. 36, 37

GSM Global System for Mobile. 41

GUI Graphical User Interface. 43

HC Health Center. 54, 57

HISP Health Information System Programme. 38, 39, 41, 58, 68, 81–84

HMIS Health Management Information System. 52, 57, 58, 61, 66, 70, 71, 80

HTML Hypertext Markup Language. 44

ICT information and communication technology. 14, 15, 22–24, 28–31, 34, 39, 83, 84

ICT4D Information and Communication Technology for Development. 30

IS Information Systems. 22–26

ISDC Information Systems in Developing Countries. 24, 83

IT Information Technology. 83

LMIS Logistics Management Information System. 7, 65, 84

MOH Ministry of Health. 52, 57, 61

MSH Management Sciences for Health. 58

NCD non-communicable disease. 53

NDC National Data Center. 67, 71

PACS Picture Archiving and Communication Systems. 18

RPF Rwandan Patriotic Front. 37, 38

SMPP Short Message Peer to Peer. 68, 71, 72, 78

SMS Simple Message Service. 7, 42–44, 57, 60, 64, 68, 70, 73, 79

SMSC Simple Message Service Center. 68

TB tuberculosis. 13, 53

UiO University of Oslo. 39, 41, 57, 68

USA United States of America. 27, 34

Chapter 1

Introduction

Todays technology offers alot of technical solutions to a variety of problems. Free and open source initiatives can provide software that before had a price tag. Technology is ever getting cheaper and internet penetratation rates are ever increasing. The technical requirements are being met. Therefore there are a puzzle to me why the technologies are not being taken advantage of. It is well known that there should be alot inefficiensies that could be remedied by introducing information and communication technology (ICT)'s in different areas. In the more developed countries of the world we have been able to apply ICT's to some level of success. In the less developed countries of the world ICT projects have a tendency to fail or the progress are not moving forward as fast as expected, should be.

Why is it then, that ICT have a hard time being applied when the oppertunities are already there? If the technologies are available and ready to being taken to use.

This thesis will try to give an answer to this question. With an action research study taken place in one of the countries that are currently trying to take advantage of the rapid technological advancements of ICT's. The Action Research (AR) project executed in collaboration with an organization called Health Information System Programme (HISP) who are currently trying to implement a Information Systems (IS) system called District Health Information System 2 (DHIS2) in several developing countries. This may provide insiders perspective on the current challenges we are facing in this area. The action research focus primeraly on introducing ICT's in the health sectior of developing countries where the need for improvement are most critical.

Firstly we explore the current status of this area in the research community. E-health gives us an introduction to why we are trying to introduce ICT's in order to improve health care. Work in transition strategies are relevant in the sense that these challenges have been met before when trying

to upgrade current systems. Introducing ICT's in developing countries has been attempted before with little success, but have resulted in experiences that can provide us with guidelines of how to avoid the same result.

Further there is another motivation of introducing ICT's in the developing countries that relates to better the economy of developing countries which introduces the "learning economy".

Then move on to more broad contextual description of the case in order to get a sense of that there are interconnected dependencies and we are not dealing with a isolated situation. Before introducing the primary result of the study I try to elaborate on the method used. With the case in context and an understanding of the method used I introduce the case as seen from my perspective.

It builds on qulitative data collected from collaborating with professionals at the Ministry of Health (MOH) in Rwanda. Combining research with everyday practise as is the main purpose of action research. In AR there are interventions that will have an effect on the problem situation. These interventions lead to the development of two applications that also are a part of this reasearch project. The experiences from this case study are therfore useful since the interventions of the project lead to concrete products and therefore successfully introduced ICT products in the health sector.

With this we can then try to answer the following questions in the discussion and conclusion.

How can we then improve the process of introducing new technology in developing countries? and what are the necessary actions needed in order to increase the success rates of ICT initiatives? Are there any new challenges that have not yet been highlighted as a result of this AR-project? In my opinion, the need to act on ICT's as a way of improving health services in the developing countries are long overdue.

Chapter 2

Conclusions

Action research are definitly one of the more appropriate methods of doing research about ICT's in the developing countries. There are to many uncertenties and unexpected events that could distrupt a more strict research approach. When doing research coming from a country with more developed technology I found that I had a tendency to over simplify tasks. This lead to a unrealistic expetctency of progress and not being able achieve the right quality of research. This being a qulitative data based study, there are a need for more quantitative data studies in the literature. In the introduction I set out to find answer to why ICT's have a hard time being introduced when the technology are available. And how can we increase the success rates and improve the terms of conditions? My answer to this is that we continue to learn from our mistakes. There are language barriers that need to be adressed. People that are not yet being accustomed to the official language of both the internet and the countries. This leads to mispelling and literature being left unused. Activities like health care does not stop because english is not the spoken language, so the supporting systems have to adapt to these challenging circumstances. An uplift in technological expertise in the local area has to be lifted. While technology are presenting much oppertunities like skype and collaboration with different version control systems, it cannot fully replace the way people usually learn. Through social interactions. Therefore we have to build on the local expertise in order to really develop. This leads to the importance of social embeddedness of ICT initiatives. The development has to take on a local perspective in order to not introduce to much innovation at one time. At the same time to avoid the sustainability pitfall, innovations has to be at a large scale. Leading to a connected agenda and a deep socio-economic change that needs to be politicaly facilitated in order to succeed. By successfully introducing ICT's at this level the developing countries has the oppertunity to become a part of the

learning economy and may be able to provide services as a knowledge based economy. Infrastructure and education are two key factors that measurable. By actively commiting to improve these areas residents are presented with both the knowledge and oppertunities to contribute to one of the ways out of poverty for the developing countries.

Bibliography

[1] Chrisanthi Avgerou. How can it enable economic growth in developing countries. *Information technology for development*, 1998.

[2] Chrisanthi Avgerou. Information systems in developing countries: A critical research review. *Journal of Information Technology*, 2008.

[3] Erran Carmel and Paul Tjia. *Offshoring Information Technology*. Cambridge University Press, 2005.

[4] Countries using dhis 2. `http://www.dhis2.org/deployments`, 2014. Accessed: 22-05-2014.

[5] E-health technologies show promise in developing countries. `http://content.healthaffairs.org/content/29/2/244.full`, 2010. Accessed: 10-06-2014.

[6] Michael Hammer. Reengineering work: Don't automate, obliterate. *Harvard Business Review*, 1990.

[7] Richard Heeks. Information systems and developing countries: Failure, success, and local improvisations. *The information society*, 2002.

[8] Richard Heeks. Ict4d 2.0: The next phase of applying ict for international development. *IEEE Computer Society*, 2008.

[9] Mikal Hem. Rwanda. `http://snl.no/Rwanda#menuitem0`, 2014. Accessed: 19-05-2014.

[10] The process of developing the dhis. `http://www.mn.uio.no/ifi/english/research/networks/hisp/hisp-history.html`, 2013. Accessed: 20-05-2014.

[11] Hisp. `http://www.mn.uio.no/ifi/english/research/networks/hisp/index.html`, 2014. Accessed: 20-05-2014.

[12] About hisp. http://hispindia.org/index.php/about-us, 2014. Accessed: 20-05-2014.

[13] Network of action. http://www.mn.uio.no/ifi/english/research/networks/hisp/network-of-action.html, 2013. Accessed: 20-05-2014.

[14] Hisp uio strategy, 2014. Accessed: 20-05-2014.

[15] Internet world stats. http://www.internetworldstats.com/stats.htm, 2012. Accessed: 24-05-2014.

[16] Bing Wu Jesus Bisbal, Deirdre Lawless and Jane Grimson. Legacy information systems: Issues and directions. *Nuts Bolts*, 1999.

[17] Sundeep Sahay Jørn Braa, Eric Monteiro. Networks of action: Sustainable health information systems across developing countries. *MIS Quarterly*, 2004.

[18] mhealth: New horizons for health through mobile technologies. http://www.who.int/goe/publications/goe_mhealth_web.pdf, 2011. Accessed: 19-06-2014.

[19] Briony J. Oates. *Researching Information Systems and Computing*. Sage Publications Ltd, 2006.

[20] Overview of ict in rwanda. http://www.rdb.rw/rdb/ict.html, 2014. Accessed: 10-06-2014.

[21] Erik S. Reinert. *Globalization, Economic Development and Inequality*. Edward Elgar Publishing, 2004.

[22] Maris G. Martinsons Robert M. Davison and Ned Kock. Principles of canonical action research. *Info Systems*, 2004.

[23] Ministry of local government. http://www.minaloc.gov.rw/index.php?id=450, 2011. Accessed: 19-05-2014.

[24] National community health strategic plan, 2013. Accessed: 19-05-2014.

[25] Folkemengden. http://www.ssb.no/befolkning/statistikker/folkemengde, 2014. Accessed: 19-05-2014.

[26] Brian Nicholson Sundeep Sahay and S. Krishna. *Global IT Outsourcing*. The Press Syndicate Of The University Of Cambridge, 2003.

[27] The impact of ehealth on the quality and safety of health care: A systematic overview. http://www.plosmedicine.org/article/info%3Adoi%2F10.1371%2Fjournal.pmed.1000387, 2011. Accessed: 19-06-2014.

[28] Hutuer og tutsier. http://no.wikipedia.org/wiki/Hutuer_og_tutsier, 2013. Accessed: 19-05-2014.

[29] Rwanda. http://en.wikipedia.org/wiki/Rwanda, 2014. Accessed: 19-05-2014.

[30] Ross Winthereik and Signe Vikkelsø. Ict and integrated care: Some dilemmas of standardising inter-organisational communication. *Computer Supported Cooperative Work*, 2005.

[31] Gross national income 2012, atlas method. http://databank.worldbank.org/data/download/GNI.pdf, 2012. Accessed: 19-05-2014.

[32] Gross national income per capita 2012, atlas method and ppp. http://databank.worldbank.org/data/download/GNIPC.pdf, 2012. Accessed: 19-05-2014.