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LEVERAGING DIGITAL INNOVATION IN HEALTHCARE: HARNESSING BIG DATA, CLOUD AND MOBILE COMPUTING FOR BETTER HEALTH

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Presenter Information

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LEVERAGING DIGITAL INNOVATION IN HEALTHCARE: HARNESSING BIG DATA, CLOUD AND MOBILE COMPUTING FOR BETTER HEALTH

Panel

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Abstract

Harnessing digital innovations for healthcare delivery has raised high expectations as well as major concerns. Several countries across the globe have made progress in achieving three common goals of lower costs, higher quality, and increased patient access to healthcare services through investments in digital infrastructures. New technologies are leveraged to achieve widespread 24x7 disease management, patients' wellbeing, home-based healthcare and other patient-centric service innovations. Yet, digital innovations in healthcare face barriers in terms of standardization, data privacy and security concerns, fragmented markets, and misaligned incentives across stakeholders. The panel will focus on this apparent paradox and highlight the potential of big data, cloud and mobile computing for achieving better health. The panel co-chairs will introduce differences in healthcare delivery landscapes in selected countries. Then panelists with expertise in digital data streams, cloud, and mobile computing will present concrete examples of healthcare service innovations that have the potential to address one or more of the global goals. ECIS attendees are invited to join a debate about the facilitators and barriers of widespread implementation of these types of digital innovations, and the opportunities for significant IS research contributions.

Keywords: Healthcare IT, Big Data, Cloud Computing, Mobile Computing

1. Panel Theme and Goals

The theme of this panel is to explore digital innovations that can positively impact healthcare delivery outcomes, given a supportive national landscape. The healthcare sector is particularly interesting since it represents a domain with a low “degree of digitization” relative to other industries, yet with the promise of significant societal and economic benefits. Today, there is an increasing opportunity for the information systems (IS) research community to leverage digital innovations that have the potential to help achieve three common goals that have become a priority for healthcare providers and governments across the globe: lower costs, higher quality, and increased patient access to healthcare services (e.g., Agarwal et al., 2010).

Some national healthcare delivery systems have made significant progress in achieving these goals by investing in the digitization of records for major patient populations and the creation of infrastructures for sharing health information across providers (Jha et al., 2008). For example, in the UK, since the formation of the National Health Service's Connecting for Health in 2005, a foundation of policies and infrastructure has led to a national-scale clinical information exchange under the NHS National Programme for IT (e.g., Payne et al., 2011). Since 2009, the United States – often considered the healthcare IT laggard among developed countries – has authorized national incentives under the HITECH programme for providers to adopt certified electronic health record (EHR) technology, in addition to granting funding for implementing state-specific health information exchange (HIE) infrastructures (e.g., Adler-Milstein et al., 2013). In Israel, this year's ECIS conference location, a coordinated strategy for health information exchange dating back to the mid-1990s has resulted in widespread EHR adoption and HIE capabilities with minimal government investment (e.g., Frankel et al., 2013).

Recent technology innovations now being adopted by other industries have also raised high expectations in healthcare. Yet these innovations have not been widely applied and have thus not been leveraged to address the three global goals of healthcare delivery. For example, the supply, integration, and sensemaking of *big data* sources offer new opportunities for multiple healthcare stakeholders: healthcare providers seeking best practice knowledge and cost reductions, pharmaceutical companies seeking efficacy data from large populations, and health insurance entities seeking better risk management (e.g., Piccoli and Pigni, 2013). In addition, more service-based approaches such as *patient-centred solutions*, as well as *cloud computing* in the backend, can facilitate communication between heterogeneous systems and provide value-added services on common platforms that interconnect formerly separated providers (e.g., Seddon and Currie, 2013). Furthermore, increasingly pervasive *mobile technology* in the hands of consumers, and industry players deploying new sensor networks and devices for collecting valuable information for patients and providers, have the potential to not only extend healthcare services to the consumer but also to disburden the healthcare provider-centric delivery systems (e.g., Peleg et al., 2013). This panel will therefore address the overall research question:

How can big data, cloud, and mobile innovations be leveraged to support the three common, global healthcare goals of lower costs, higher quality, and increased patient access to healthcare services for better health?

Given the increased opportunities for IS research in healthcare, including collaborations with industry sponsors, our intent is for ECIS attendees to not only learn about examples of specific digital innovations in healthcare delivery now found in some national and regional contexts, but to also debate what types of environmental barriers can deter, or slow down, the widespread deployment of these innovations. For example, frequently mentioned concerns for local and inter-organizational information sharing include standardization issues, data privacy regulations, technical security concerns, fragmented market structures, healthcare provider competition, lack of trust between otherwise unrelated stakeholders, different legal frameworks, and misaligned incentives across stakeholders (e.g., Aanestad and Jensen, 2011; Edwards et al., 2010).

2. Panel Format

The panel is divided into three parts, each addressing a specific question. Parts A and B of the panel are designed to share examples of emergent digital innovation opportunities – big data, cloud computing, mobile computing – within different healthcare contexts. Panelists will discuss the potential impacts of these innovations on the three global healthcare goals relative to the differences in national healthcare landscapes. With this background, Part C will then engage the audience in debating the potential for widespread implementation of these digital innovation examples, including perceived barriers or facilitators, as well as opportunities for significant IS research contributions.

Part A: What do the three global goals in healthcare entail, and what is the overall status of IT investments to help achieve them in the healthcare delivery systems of selected countries?

Carol Brown and *Tina Blegind Jensen* will provide a short introduction to the panel and the three global healthcare goals. Then they will present an overview of the changing healthcare delivery landscapes in selected countries with a focus on regulatory and policy environments that in the recent past have facilitated or hindered the implementation of digital innovation of healthcare services.

Part B: What are examples of recent digital innovations in different regional and national contexts that have the potential to positively impact the achievement of the global healthcare goals for better health?

Four panelists will provide state-of-the-art presentations of different digital innovations with specific examples from the healthcare sector, followed by a discussion of the potential impacts on one or more of the three global goals:

Margunn Aanestad will discuss the notion of patient-centricity and attempts to establish patient-centred tools and services in the Norwegian healthcare system. She will point to some important drivers and barriers for the realization of such initiatives and discuss their implications.

Wendy Currie will address cloud computing and describe issues related to the cross-border transfer of health data, and the U.S. and EU regulatory frameworks which govern data flows across different legal jurisdictions. She will also discuss important privacy and security issues.

Federico Pigni will provide a framework for how digital data streams and big data in healthcare can be leveraged together with other analytical capabilities for value creation. He will also outline the main drivers of this healthcare big data revolution.

Yuval Shahar will focus on how mobile e-Health in particular empowers patients and paramedical personnel, thus changing traditional methods of practicing medicine. He will also provide examples of effective remote healthcare delivery in Western Europe and the U.S., as well as developing countries.

Part C: What are the facilitators and/or barriers to the implementation of these innovations in different national healthcare contexts – and what then are the opportunities for significant academic research contributions?

Based on the examples of recent digital innovations in different contexts, the panel facilitator will engage the audience in debating the potential for widespread implementation, given the regulatory and policy barriers and facilitators in different healthcare contexts. Ideas for research will then be elicited, including potential industry collaborations.

3. Panelists

This panel brings together academic researchers with different backgrounds and from five different nations to share their insights. The panelists include senior and junior researchers from Denmark, France, Israel, Norway, and the U.S. who have conducted in-depth research on the digital technologies of interest: digital data streams/big data, cloud computing, and mobile applications. As a group, the panelists not only all have experience in healthcare research topics, but also have published on related technology, organizational, and medical research topics. Short bios for all organizers and panelists are provided below.

Carol V. Brown (co-chair) is a Distinguished Service Professor in the Howe School of Technology Management at Stevens Institute of Technology and a former Editor-in-Chief of *MIS Quarterly Executive*. Her research interests are strategy and management issues of importance to senior IS managers. Since joining Stevens in 2007, she has developed healthcare IT management courses that take into account the fast-changing U.S. healthcare landscape and initiated healthcare IT research studies on topics of importance to CIOs in healthcare delivery organizations.

Tina Blegind Jensen (co-chair) is Associate Professor of Information Systems at Copenhagen Business School, Denmark. Her research focuses on organizational and managerial issues of information systems in the context of implementation and use. She is particularly interested in studying the relationship between people and technology in healthcare organizations with an emphasis on sensemaking among users, institutional structures, and the changes in the nature of work practices.

Till Winkler (facilitator) is Assistant Professor in Information Technology Management at Copenhagen Business School, Denmark. His research examines the interplay of IT governance and the adoption of platform-based technologies such as cloud services and mobile technology within and across organizations. His most recent qualitative research study focuses on governance issues within the healthcare sector.

Margunn Aanestad (panelist) is Professor in the Department of Informatics at the University of Oslo. She has conducted qualitative research on technology-enabled transformation of healthcare services and organizations. Her current research is oriented towards multiple initiatives that seek to establish new tools and service models for patient-centred and personalized medicine.

Wendy Currie (panelist) is Professor of Information Systems at Audencia, Nantes, Ecole de Management, France. She is Editor-In-Chief of *Health Policy and Technology*. Her research focuses on the intersection between technology policy and strategic implementation. Using institutional theory, she has recently completed funded projects on e-Health policy and practice in 28 European Union Member States, a comparative analysis of cloud computing in healthcare across five countries, and mobile health adoption across different legal and regulatory jurisdictions.

Federico Pigni (panelist) is Assistant Professor and director of the Global Tech program at Grenoble Ecole de Management, France. His expertise is in strategic information systems and the use of information systems to enable customer service. He is currently researching value creation and appropriation opportunities stemming from big data and digital data streams, and their impacts at the organizational and industry level, with a particular focus on the healthcare sector.

Yuval Shahar (panelist) is a Professor of Information Systems Engineering with both MD and PhD degrees at Ben Gurion University, in which he also heads the Medical Informatics Research Center. His research focuses on temporal reasoning, therapy planning, knowledge representation, and decision analysis in biomedical domains. He was granted in 1995 the NIH 5-year FIRST career award; in 2005 an IBM Faculty Award; and in 2008 an HP Worldwide Innovation Program award. He is also an International Fellow of the American College of Medical Informatics (ACMI).

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