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A CASE STUDY OF HEALTHCARE INFORMATION TECHNOLOGY IMPLEMENTATION: AGILE-INNOVATIVE CAPABILITY DEVELOPMENT PROCESS

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Abstract

With the advances in Information Technology (IT), the potential of IT in enabling enterprise agility has received increasing attention from practitioners and the academia in recent years. However, despite the recent advance of knowledge on agility and IT innovation, the relationship between the adoption of IT and enterprise agility is often treated as a "black box" and empirical validation of the relationship between IT and enterprise agility is still scare. Moreover, the importance of agility in healthcare sector has largely been ignored. Our study proposes a three-stage process model that describes and analyzes the ways how agility and innovative capabilities are implemented and managed during the innovation of healthcare IT in a hospital. Theoretical and practical contributions were shared and documented in this paper.

Keywords: Information Technology in Healthcare, Agility, Innovative Capabilities and Case Study.

1   INTRODUCTION

In today's competitive environment, businesses in all industries, including healthcare are undergoing profound changes. With a total spending of more than US$4.1 trillion (World Health Organization 2007b), healthcare industry is known as the single-largest industry worldwide. Recognizing the massive size and continuing growth of this industry along with its potential of transforming societal health-and-wellness quality, the Singapore's Ministry of Health sets the mission to develop the world's most cost-effective healthcare system to help keep Singaporeans, the country's key resources, in an ideal state of health (World Health Organization 2007a).

Embarking the ways of exploring the opportunities and challenges in the development and use of medical informatics in relation to minimal guidance and policies drawn from the government, Singapore hospital industry leaders are put to the challenge. Towards an unknown future, healthcare experts, policymakers, payers and consumers find that computerization and automation of health records and processes could critically transform the scenarios of healthcare industry (Dwivedi et al. 2007). To shape the future of the healthcare industry, not only organizations need to be agile to detect and size market changes and opportunities (Sambamurthy et al. 2003) with significant flexibility and response than before (Gould 1997) but also ability to innovate (Lawson & Samson 2001). Hence, the agility is critical for organizations to sense and respond readily to the future need and innovation (Overby et al. 2006).

With the advances in Information Technology (IT), the potential of IT in enabling enterprise agility has received increasing attention from practitioners and the academia in recent years (Mathiassen & Pries-Heje 2006; Overby et al. 2006; Sambamurthy et al. 2003; van Oosterhout et al. 2006). However, despite the recent advance of knowledge on agility and IT innovation, the relationship between the adoption of IT and enterprise agility is often treated as a "black box" and empirical validation of the relationship between IT and enterprise agility is still scare (e.g. Overby et al. 2006; Seo & La Paz 2008). Moreover, the importance of agility in other sectors, such as healthcare, has largely been ignored. In view of this, agility and innovative theory were employed as the theoretical lenses to further structure this research. However, the challenge is that, an acceptable, comprehensive and systematic framework towards successful innovation has yet existed (Lawson & Samson 2001). More importantly, the scarcity of studies on innovative change in the servicing industries (Amble & Palombarini 1998; Aranda & Molina-Fernandez 2002; Martin & Horne 1993) has add-on the value of this research.

For this reason, we intend to bridge the research gap by conceptualizing the agility-innovative development process from a case study based on the story of a private hospital that has successfully designed and injected agile and innovative philosophies into its healthcare systems. This hospital, which we use "HH" to name it in this paper, was once the hospital in Singapore with high patients' complaints and challenged by Singapore Health Minister at that time. However, it has managed to develop the agile-innovative capabilities and has been crowned as the best in the Singaporean Ministry of Health Patient Satisfaction Surveys from 2004 to 2008. Thus, there is ground to believe that insightful lessons on its agility and innovative use of technologies and change in processes and service qualities can be gained through this Singapore based research.

2   THEORETICAL BACKGROUND

2.1   Enterprise Agility

The proposed theoretical conceptualization in this study is drawn from agility theory as the overarching theory for innovation and capability studies. An agile firm is tidily related with firm's resources and capabilities (Nambisan 2002), including innovation (Malone et al. 1999). Especially, agility is vital to the innovation and competitive performance of firms in contemporary business environments (Sambamurthy et al. 2003).

Enterprise agility was coined from the historical progression from mass manufacturing to agile manufacturing concept (Dove 2001; Sharp et al. 1999), then followed by software developing industry (Cockburn 2001). The emergence of such concept is rooted in the new business era where "change" is one of its major characteristics (Sharifi & Zhang 1999). Thus, an agile enterprise would have the capability of surviving and prospering in competitive environment of continuous and unpredictable change by reactive spontaneously to the market (Gunasekaran 1999). Such definition is further refined by Overby, et al. (2006) as the ability to sense environmental change and respond readily. Agility is concerned with economies of scope, rather than economies of scale (Dove 2001). Where lean operations are usually associated with efficient use of resources, agile operations are related to effectively responding to a changing environment while at the same time being productive (Mathiassen & Pries-Heje 2006). An agile enterprise is not only capable of successfully implementing change, but also nimble, capable of responding quickly and gracefully to both expected and unexpected events in their environment (Mathiassen & Pries-Heje 2006). Accordingly, agility is tidily related with the firm's resources and capabilities. In other words, agility encompasses a firm's capabilities related to customers (Nambisan 2002), internal operations for innovation and competitive action (Malone et al. 1999), as well as utilization of networks to explore opportunities for innovation and competitive actions (Choudhury & Xia 1999). Firms that have developed more complex base of resources and capabilities will have the higher capability to compete (Ferrier et al. 1999; Sambamurthy et al. 2003).

2.2 IT Innovation in Agile Business Context

The diffusion of IT-based innovations could play a crucial role in shaping business agility by enabling the sense and responding capabilities of firms (Mathiassen & Pries-Heje 2006; Overby et al. 2006; Sambamurthy et al. 2003). According to Overby et al. (2006), IT, as a platform, enables agility in two ways, directly and indirectly. In certain contexts, a firm's capability would directly relate to enterprise agility. With adequate level of IT capability, a firm may be able to anticipate or sense changes relevant to their businesses that are brought about specifically due to advances in IT. Also, IT capability would be critical for responding to opportunities in IT-driven industries such as financial services, retailing, telecommunications, and hardware/software (Sambamurthy et al. 2003). Indirectly, IT is also critical for building enterprise agility by providing the infrastructure on which business functions and processes depend. With the help of IT, a firm could build its capability in articulating knowledge by enlarging the breath of resources and quality of information. Similarly, IT would help firms by extending process research so that firms are better integrated internally and with customers and partners. These studies share an common underlying assumption that "ability to quickly change the type and flow of information within an organization must underlie a rapid and graceful reorganization" (Mathiassen & Pries-Heje 2006) and accordingly, agility in IT adoption/diffusion must necessarily lead to enterprise agility. However, treating the relationship between the adoption/diffusion of IT and enterprise agility as a "black box" could be problematic because even though IT has the immense potential for facilitating enterprise agility, the organizational impact of IT per se tends to be limited unless it is aligned with strategic objectives and broader capability building process of an organization.

A special type of IT application is Health Information System (HIS). The HIS research refers to the multidisciplinary body of knowledge related to the design, development, implementation and use of information-intensive technologies in healthcare settings (Chiasson & Davidson 2004). By adopting a Health Information Systems (HIS), we could most probably share some similar concepts and situations in normal IS adoption. For example, Kijsanayotin et al. (2009) applied the Unified Theory of Acceptance and Use of Technology (UTAUT) structural model to investigate factors that influence health IT adoption in community health centers in Thailand and validated the UTAUT model in the field context of a developing country's healthcare system (Kijsanayotin et al. 2009). Nevertheless, the adoption could be quite different from the generic IS approach, given its specific purposes in serving the healthcare practice (Chiasson & Davidson 2004). In a recent review of HIS development in the past two decades, Haux (2006) synthesizes seven lines of development in the HIS from the past to present, and suggested consequences for HIS in the future (Haux 2006, for a systematic review). In terms of theory development, Heeks's (2006) proposed a "design-reality gap" conceptual model

which highlighted HIS implementation challenges. The seven gaps suggested are: information, technology, processes, objectives and values, staffing and skills, management systems and structures, and other resources (Heeks 2006). In a more recent study, Puri and his colleagues suggested developing participatory networks to support the design, development and implementation of HIS in the context of public healthcare (Puri et al. 2009).

3   METHODOLOGY

A case study was carry out to investigate our research interest, as it provides the researchers to explore contemporary events in the case company (Winter 2003) with the empirical inquiry research on "how" and "why" questions (Lazonick & Prencipe 2005). The main interest of this study is to discover how HH hospital innovates in a volatile environment to set a new healthcare industry model for Singapore through development of agility and innovative capabilities. Further, since an interpretive case study is an appropriate means of empirical inquiry (Lazonick & Prencipe 2005) when the phenomena to be studied are complex and not easily separated from its original context (Yin 1994), the scarcity of research in this phenomenon (Amble & Palombarini 1998; Aranda & Molina-Fernandez 2002; Martin & Horne 1993) has further substantiated the choice of case study research method. This case study is particularly appropriate for the purpose of our study because HH was once a hospital which received large amount of patient complaints. However, through the agility and innovative development, it transformed into a leading hospital in Singapore and was labeled as the piloting prototyping in leading the future standards of the Singapore Healthcare industry.

3.1   Data Collection

A total of 19 face-to-face interviews with nine distinct interviewees were conducted over a six month period. All interviews were tape-recorded and transcribed, with photos and additional notes taken to collect the best possible events of the case. Each interview session lasted between 1.5 to 3 hours, with informants ranging from nurses, IT specialists, doctors and top-management personnel having an average of three years working experience. We adopted a practical way of understanding textual data that was suggested by Klein and Myers (1999), i.e., via personal visits, emails and phone contacts to foster relationships among researchers and key informants. By doing so, it enables us to understand their rich depictions (Yin 1994) underlining the meanings of their expressions (Hirschheim et al. 1991) so as to discover the core-case information that is necessary for the comprehending, analyzing and evaluating of the case study (Klein & Myers 1999). To ensure the quality of data collected, we triangulated the data collected with other resources including empirical observations, follow-up email clarifications, along with about 230 softcopy documentations and archive records.

3.2   Data Analysis

Data analysis was performed in tandem with data collection as suggested by Eisenhardt (1989) case research methodology style. Based on our agility, IT innovation and innovative capability literature, we further refined our theoretical lens in guiding for emerging themes of the collected data (Eisenhardt 1989). The data obtained were organized and coded according to the set of themes with at least two sources of data (Klein & Myers 1999). We addressed the emerged themes based on our preconceptions through logical reasoning and via the data triangulation method (Klein & Myers 1999) to challenged the existing schema emerged (Walsham 2006). Data analysis was then being map and verified between empirical data, the theoretical lens, relevant literature to sharpen the constructs definitions and raises theoretical level in our model development.

4   CASE STUDY

4.1   Case Background

Health IT has become a priority for the Singapore government since 1999. And the call for "Exploit IT Maximally" by the Minister of Health has further encouraged hospitals to improve their Healthcare

systems. In-line with government's aim, HH, the hospital with high patients' complaints at that time has decided it is time to improve. For years, HH was managed in the traditional hospital settings with poor patients' service and long waiting time. The situation became more apprehensive as the shortage of medical staff worsened. Therefore the ground morale of medical staff was low owing to overwork under insufficient IT support. Naturally HH loses its competitiveness to its rivals in losing patients and making loses over the time. In responding to the challenge, HH benchmarks itself to become the Mayo Clinic of Asia complimenting with the objective to provide patients with the hassle-free experience. To counter this crisis heads on, many innovative initiatives supported by IT were adopted by HH to accomplish its objective before turning the tides to becoming the best performing hospital in patients' service since 2004.

4.2 Grounding for an Innovative Breakthrough

In the search of innovative breakthrough, HH's objectives focused on searching for the fastest and most efficient ways in providing a unique patient-centric service. Pioneering the change with a moderate move, HH adopted a special combination approach. First, HH learned from the best practices of US-Japanese Medicine/Healthcare systems, integrating them with the Toyota Lean manufacturing philosophy from Japan and workshops in Singapore. According to the Director of Projects:

> *"You cannot hang on to the old horse, the old technology. You must leapfrog, move into a new platform by learning from others, that's why we were sent to US and Japan"*

Sensibly and wisely, HH management team exploited its strong collaborative culture between managerial and clinical staff to influence the relevant stakeholders for their intellectual and emotional buy-in before kicking off a series of 'Kaizen' activities.

> *"We believe in taking small steps in rapid succession approach, where we test new technology and deploy them if suitable" Director of Projects*

Further, HH management team decided to invest in IT infrastructure to support the upcoming innovation because they believed that a new health information system could 1) provide technical capabilities and an overall technical base that can be leveraged while developing innovation solutions, and 2) enabled quick sharing of information across departments.

4.3 Retrofitting for Innovative Idea Integration

The hospital is filled with synergy to integrate various technologies and devices through continual experiments in search for more efficient and effective safer-care services to patients. Soon after a combination of processes and technologies were selected, the operation team proposed the need to set up a common platform with the integrated healthcare information systems to the top-management.

To match the innovation proposal, several intensive meetings on costs-and-benefits analysis were held by the top-management. Eventually, the top-management decided to invite external collaborators for strategic partnerships in improving the department physical layout, business workflow and the integrated healthcare information systems. The director of operations explained:

> *"We are a small hospital. So (for) some of the things we implemented, cost is important, as we don't have the financial arm to bring in the big software players..."*

After drafting the emergency department (ED) workflow requirements, HH sent the proposal to a Singapore polytechnic college as an assignment topic to reach out for external resources. Within the three months, HH received the IS prototype for ED from the Singapore polytechnic college regarding the newly designed system. After a several walk-through and test-runs based on the prototype, another issue was identified. To provide a hassle-free ED visit, patients waiting time for warding must also be reduced. Building on to the operation team capability in identifying issues through a series of

"kaizen" activities, pull-system was suggested as the solution. According to the Project Specialist, Operations:

> "When you introduce a pull system for beds, it means that you are by providing information to the ED staff on which beds will be available for disposal rather than having the necessity for nurses' callings to look for any available bed"

In view of the need for the pull-systems, HH extended their partnership with three different software and hardware companies for support to kick-start the systems and its applicability by integrating and extending the services from ED to the bed management. To support and collaborate with external parties, the operation team provided conceptual ideas gathered from users to assist the pilot test for ED and the integration of a wireless device that updates a database which keeps track of the patient's admission and discharge. This concept and technology was tested and rolled out to support the operation flow of HH preference. For that, when a patient is supposed to be discharged, the Patient Service Associate (PSA) at the ward will click the system to indicate the "planned/intended discharged" so that a message will be sent to the housekeeper to tidy up the bed within three hours (a specific time). Simultaneously, another message will be sent to the ED to preparing the patient to be ready for immediate discharge. This synchronization and integration of activities, workflow and processes between departments and nurses were test-run/commissioned for a few months in Ward XI. To the management surprise, significant improvement had been made with the integrated systems and wireless devices in place. Within the span of a few weeks, Ward XI topped the list to become the most efficient ward with the least turnaround time.

4.4   Establishing the Interactive and Innovative Information Technology

After the successful application of ED and bed management systems, the systems were put in place. For the convenience of the interactivity and agility of the systems, the physical layout of the emergency ward was renovated to ensure the point-to-point stations were suitably located for effective and efficient services. Based on the strengths of the HH staff, the head of ED strategically decided to revamp the triage system by allocating a senior doctor (an experienced doctor), instead of deploying a junior doctor (trainee medical officer) to serve as the first point of contact with patients in the initial consultation process. Such a move had initially sparked some doubt on the wisdom of the decision; however it had proven to be a wise move at the end of the day. Hence, this has enabled HH to venture into a new paradigm of delivery service.

In sustaining the success of the change, briefings were routinely scheduled to update the clinical staff to provide consistence support to the new arrangement. According to the senior nurse manager:

> "(The revolution) is a journey of improvements; we are still striving for perfection through continuous improvement and maintaining consistency"

Among all, credits must also be given to the operations team in designing a very user-friendly system. Within a week after the roll-out, PSA could handle and use the system without any problem.

Taking a bold move to improve the workflows and innovatively develop a better system from scratch is an achievement and a great leap forward for HH. The entire innovation service transformation was a great success: 1) HH has tremendously improved patients' satisfaction, and also successfully expedited patient flow with an average from 22 to 70 patients attended per hour, 2) Reduced patient waiting time by 50%, and 3) the newly designed system has contributed to the recording and retention of patients' medical history electronically. With such improvements, HH was voted as the best hospital in patients' service since 2004.

5   DISCUSSION

Basing on the innovative activities and processes conducted by HH, we developed an Agile-Innovative Capability Process model (refer to Figure 1) of how an agility-innovative capability can be developed and leveraged from a hospital that has set the new hospital industry standard for Singapore.

Our model suggests the development and subsequent leverage of agility-innovative capability is a sprightly complex-helix process of a firm's sensitivity and responsiveness in integrating and reconfiguring resources to cope with the change within and outside the firm (Eisenhardt & Martin 2000) for innovation. Given that our model is inductively derived from the HH case study data, the following discussion provides an explanation of how the existing literature corroborates our model and how our model contributes back to the existing literature of agility and IT innovation.

Process Model of the Agile-Innovative Capability		
Grounding for an Innovative Breakthrough	*Retrofitting for Innovative Idea Integration*	*Establishing the Interactive and Innovative IT*
The Leading Agility Process		
Sensible agility	Compliant agility	Interactive agility
By establishing at a sensible position to fulfill external (e.g. government) and internal (e.g. patients) expectations through the exploration of internal operations for innovation and competitive action	To fit and match external and internal requirements, practices, expectations exclusively in enriching the patients experience	To providing interactive and service experience to users and offering responsive updates to IT team for further upgrade and improvements.
The Innovative Capability Process		
Transformative innovation capability	Integrative innovation capability	Adaptive innovation capability
Enhanced internal and external resources with collaboration between managerial and clinical staff capability to innovatively transform clinical processes based on the manufacturing workflow	By integrating technologies, managerial and clinical processes, and resources articulated from partnerships to develop patient-centric innovative healthcare systems	By enhancing the adaptability to the new healthcare systems through aligning new processes innovatively to benefit patients
Managerial Initiatives		
Prompt review to the environmental change Provide sensible learning and training opportunities Cultivate for emotional buy-in Nurture and encourage collaborations	Accommodating to new suggestions Adopt iterative or continues improvement in integrating new ideas.	Offering responsive support to users in modifying the system Providing continues training to users

Figure 1: Process Model of the Development of Agile-Innovative Capability

5.1   Phase 1: Grounding for an Innovative Breakthrough

At the time of grounding for innovative breakthrough, HH tactically plan for its innovative changes by aligning with the sensible agility and transformative innovation capability. To be sensibly agile, HH was 1) sensible towards the compulsion for improvement, 2) sensible towards organizational needs and resources. With the ambition of becoming a leader in the industry, HH took the first mover challenge by initiating its sensible agility approach to minimize first mover disadvantages (Lieberman & Montgomery 1988) by first, screening its external (government) and internal (patients) expectation before launching for further commitment in transforming the hospital. Sensibly with a fair understanding of public expectations, HH then responded by sending management staff to learn from the healthcare industry leaders in US and Japan. By doing so, they learned from the best of both world- Western and Asian healthcare best practices. By learning from the lessons learned overseas HH established itself as the first mover with manageable IT investment risk (Benaroch 2002), since action taken was though agile but also methodically sensible.

With the strong collaborative and innovative cultural background, HH demonstrated its transformative innovation capability through the 1) capability to transform concepts and knowledge to practical

improvement, 2) capability to collaborate for transformation. As evident from the case, HH's managers transformed and extended knowledge and concepts learned from the TPS manufacturing workflow to improve the healthcare workflow processes. Responding to transform knowledge to practice, collaboratively HH managerial and clinical staff articulated its operational processes to identify bottlenecks and prepare counter measures in improving the glitches in the workflow that contribute to high patient waiting time. These capabilities in aligning transformative innovation refer to a manifestation of IT innovative capabilities (Wang & Ahmed 2007). Thus, with sensing agility and innovative transformation capabilities, HH has strategically paved itself for a rapid and graceful reorganization (Mathiassen & Pries-Heje 2006) and innovative breakthrough.

5.2   Phase 2: Retrofitting for Innovative Idea Integration

To retrofit for innovative idea, HH strategically aligned with the compliance agility and integrative innovation capability in the second phase of healthcare IS development. By being agile to-fit and match innovative ideas, changes and solutions introduced by external (partnership) and internal (managerial and clinical staff), HH 1) compelled flexibility to accommodate changes, 2) paid attentive attention in problem solving, and 3) reacted dynamically in confronting issues. Responding with its ability to conform, HH demonstrated its strength in leveraging and matching the assets, knowledge, competencies from internal and external parties; react quickly to the expected and unexpected events accurately exploiting any opportunities arises (Mathiassen & Pries-Heje 2006; Sambamurthy et al. 2003). In other words, the compliant agility would facilitate the user-producer partnership and coordination in creating a complex and new-to-market innovation (Koch & Strotmann 2008).

It is insufficient to be compliantly agile without the ability to integrate technologies, managerial and clinical processes, and resources articulated from partnerships. To develop such capability, first, the HH team focused on integrating conceptual innovative ideas to actionable plans. Knowing that external 'best practices' might be valuable resources but need to be internalized and 'localized' before they can play an positive and significant role, HH organized open discussions among team members and non-team member staffs from various functions and different levels to evaluate each innovative ideas and alternatives. Further, every critical innovative idea was implemented through a trial-review-implement process. As evident in HH, a health IS for the department emergency management was developed from Singapore polytechnic college before extending and improving its development with three partnerships. Second, HH developed capability to retrofit the systems tactically by identify and investigate new avenues (Burgelman & Maidique 1988) to modify and improve the current processes with strong top management support. In which, HH demonstrated the capability to deal, process, interpret, manipulate and access information to resolve complicated problems/issues in a purposeful, goal-directed manner so that an organization can increase its potential to adapt and operate strategically (Glynn 1996; Lawson & Samson 2001).

5.3   Phase 3: Establishing the Interactive and Innovative Healthcare Information System

The success in introducing a groundbreaking healthcare information system was achieved by aligning interactive agility and adaptive innovation capability. To be interactively agile, HH operations team was 1) responsive towards user's feedback, 2) sensitive towards the system interactive and flexible mode supported by the system. Throughout the innovative IT system development process, organizational intelligence was developed to facilitate HH operations team with responsive and interactive ability in fine-tuning technical and processes improvement suggested by users before introducing the change to all departments. Secondly, interactive and flexible mode supported by the system has also empowered the agility of the system and its process operation in the hospital. By offering responsive updates to IT team, HH was able to continuously upgrade and improve the system. Consequently, HH was able to provide interactive service experience to patients with the support of a continuously improved IT system.

The adaptive innovation capability was developed by enhancing the adaptability to the new healthcare systems through aligning new business processes to benefit patients. It was achieved through a series of detailed activities including aligning business processes, smooth and seamless transitions,

interactions among users (managerial staff and clinical staff), customers (patients), and developers (IT staff and service provider) to provide feedbacks and guidance. Two initiatives were demonstrated to be critical for the developing of adaptive innovation capability 1) developing new skill sets in adapting to innovation and 2) encourage open and sharing culture in adopting innovative systems. To make the potential benefits of the new processes and systems real, users, no matter clinical staff or management staff, have to adopt the new system and adapt with the new processes and systems. Further, the success of HH' practice in developing skill capability was also attributed to HH's organizational culture, which was pride of its staff as open and supportive towards changes and innovations.

6   CONCLUSIONS

The purpose of our paper is to conceptualize on the generation of agile-innovative capability derived from agility, IT innovative and innovative capability literature. This model proposes a process model that describes and analyzes the ways how agility and innovative capabilities are implemented and managed during the innovation of healthcare IT, in the backdrop of a hospital setting, with the aim of initiating a new milestone for the healthcare industry in Singapore. As evident in the case, we have developed an agile-innovative capability model that depicts agility and innovation in a complex manner, whereby an organization's key resources are decomposed into three phases: (1) grounding for an innovative breakthrough, (2) retrofitting for an innovative integration, and (3) paving to an interactive and innovative hassle-free Information System.

Our study should provide profound implications for researchers and professionals. Theoretically, this model proposes and clarifies a series of structured activities and systematic processes learned from the case study in achieving agile-innovative capability. Based on the study, our model has contributed to providing some answers in responding to the lack of innovation studies in service firms (Aranda and Molina-Fernandez, 2002) thus serving as the basis for further investigations.

For professionals, this study contributes three key interesting insights for planning, cultivating, practicing and managing the agile-innovation capability in the healthcare industry. Firstly, managers need to be sensible on their goals and plans by establishing emotional-buy in from the medical staff before nurturing for internal and external collaborations. Secondly, managers have to be flexible in providing support to managerial and clinical staff in adapting and matching skills with the available technologies. Thirdly, managers are also required to be responsive in providing interactive support to users with appropriate plans and trainings to align them to the new managerial and clinical processes in order to deliver a higher level of services to patients.

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