



UNIVERSITY OF GOTHENBURG

# Professionalism and IT

A study of Japanese healthcare

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# Abstract

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The purpose of this study has been to determine what role professionalism has in the introduction of IT.

Theory suggest that professionalism is a potential cause for rational as well as irrational issues, encompassing a spectrum ranging from gaps in expertise to matters of professional pride. Rational or irrational, professionalism is said to be a potential barrier for collaborative efforts. This would, if true, be an impediment for the successful introduction of IT as its main purpose is communication and facilitating collaboration.

The professional context chosen for the study was healthcare and the geographical context elected was Japan. The study was separated into two phases, the first of which consisted of a number of interviews with individuals knowledgeable of either healthcare in general or Japanese healthcare in particular. This study revealed a number of issues which directly or indirectly affect the introduction of IT into Japanese healthcare. The preliminary study also suggested a number of ways in which change efforts in healthcare may be facilitated.

Following the preliminary study, a number of case studies were carried out at medical facilities in Japan. These were subsequently analyzed based on a synthesis of theoretical underpinnings and results of the preliminary study.

The analysis shows that professionalism may have either detrimental or beneficial effects based on the situation.

- Lone professionals focusing only on their own working environments tend to have a detrimental effect on the introduction of IT as they lack a comprehensive view of the organization. A strong management possessing an adequately holistic perspective is therefore needed to counter the myopic perspective of the single professional.
- However, a large group of professionals able to reach a consensus or compromise tend to have a beneficial effect on the introduction of IT – even if they are still focused on a single issue. In this case, the need for management is reduced as the consensus reached among peers yield as sufficiently wide perspective.

Also noted were distinctly different perspectives on how matters relating to IT were treated. The more common approach was to utilize special forums or meetings where technical issues were discussed. A less common approach was to process matters relating to IT through conventional channels – just like any other business. Empirical data is however insufficient to determine what – if any – impact these different approaches have on the professional workplace. This would, in the researcher's opinion, be a suitable area for future research.

Keywords: Professionalism, healthcare, IT, Japan

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## Introduction

*The introductory portion will highlight the underlying issues that form the background for this study. This will form the basis for the research question.*

## Background

In July 2009, the IT Strategic Headquarters under the authority of the Prime Minister of Japan and his cabinet presented the “i-Japan” strategy document<sup>1</sup>. This document follows the previous “e-Japan strategy”, “e-Japan strategy II” and new “IT reform strategy” of 2001, 2003 and 2006 respectively. Although a distinction can be made between the more technically oriented e-Japan strategies and the focus on application in the latter IT reform and i-Japan strategies, they carry with them the same ultimate goal: To make Japan a world leader in usage and availability of IT.<sup>2</sup> The dissemination and adoption of electronic services is expected to facilitate sustainable economic growth in existing industries as well as bring about new areas of business and commerce. The need for economic growth is indeed felt in Japan as its national debt currently amounts to approximately 200% of the annual gross national product.<sup>3</sup>

The woes are however not limited to financial concerns. Another much publicized issue is the aging population and low birth-rate in Japanese society.<sup>4</sup> If current trends persist, 30% of the Japanese population will be above the age of 65 by 2030. This, in turn, gives rise to new problems in that the need for medical care typically increases with age. Combined with a smaller workforce brought about by persisting low birth-rates, the challenge facing Japanese health care is daunting. For this reason, healthcare is one of three areas given extra attention in the i-Japan strategy. Specifically, telemedicine and Electronic Medical Records (EMR) are named as key issues and potential benefits of a digital society. Another potentially useful (but not included in the i-Japan strategy document) tool is the introduction of robotics into healthcare. The level of expertise displayed by Japanese engineers in this area has drawn attention from several countries, including Sweden.<sup>5</sup>

Robotics, telemedicine and EMR all represent technologies that are either new in and of themselves, or new to the context into which they are to be introduced – namely healthcare. Regardless of their level of novelty, they all represent technical applications and as such they require an enabling infrastructure in order to serve their purpose. As information technology infrastructures are not purely technical in nature but rather *socio-technical*<sup>6</sup>, this effectively represents an intersection of two distinct fields – medicine and information technology (IT). As such, the adoption or failure of any system or technology in the realm of healthcare is dependent on the volition and ability of individuals from these two professions to see eye to eye. Coexistence and cooperation are prerequisites for the establishment of a sound IT infrastructure in healthcare. Without them there is little hope of introducing novel applications of IT into healthcare.

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<sup>1</sup> IT Strategic Headquarters, 2009

<sup>2</sup> IT Strategic Headquarters, 2001, 2003, 2006, 2009

<sup>3</sup> Embassy of Sweden Science and Technology Office, 2010

<sup>4</sup> IT Strategic Headquarters, 2009 / Embassy of Sweden Science and Technology Office, 2010 / The Nikkei Weekly, February 15<sup>th</sup>, 2010

<sup>5</sup> The Nikkei Weekly, February 15<sup>th</sup>, 2010

<sup>6</sup> Ciborra, 2000

## Purpose

IT investments in healthcare represent a merger of two fields - medicine and IT. These two professional fields represent different areas of expertise with their own vocabulary, skills and perspectives which has the potential to bring about difficulties in communicating on a professional basis.<sup>7</sup>

Also, literature suggests a clear distinction in professional status between the two fields. IT is a secondary technology that supports other functions and other areas of expertise.<sup>8</sup> Therefore, IT-staff as a group tends to be imbued with a low degree of professionalism as their efforts are often not clearly visible to other occupational groupings.<sup>9</sup> Medical staff, on the other hand, represents the height of professionalism and the fruits of their labors present obvious, tangible results. A profound sense of professionalism can, however, have adverse consequences in that individuals may be disinclined to pay any notice to those not part of their own professional grouping.<sup>10</sup>

IT and medicine are two distinct areas of expertise which represent formidable barriers for those uninitiated. IT does not in and of itself have any purpose or use – those are attained in its application.<sup>11</sup> Implementation of Information Technology therefore not only has to be finely crafted, but also suited to the needs and wants of its intended user. This may be a tall order if one does not understand the intended user or the context into which the artifact is to be introduced.

Miscommunication or a disproportionate level of influence between medical professionals and IT professionals will therefore, one can assume, result in an IT infrastructure that will be a far cry from purposeful application of medical technology. If the introduction of IT into healthcare is to be truly beneficial as opposed to a hindrance to medical professionals, then doctors, nurses and technicians must not only be *able* to cooperate, but also be *willing* to do so.

The purpose of this study is therefore to examine the influence of professionalism on the introduction of IT in healthcare. The research question can be stated as:

- *What role does professionalism have on the introduction of IT in healthcare?*

As it turns out, the effects can be both positive and negative – making the effects every bit as ambiguous as the construct of professionalism itself.

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<sup>7</sup> Holmqvist & Enquist, 2003 / Enquist & Makrygiannis, 1998

<sup>8</sup> Dedrick et al., 2003

<sup>9</sup> Dunleavy et al., 2006, p. 37-39

<sup>10</sup> Holtman, 2009 / van Mook et al., 2009

<sup>11</sup> Bate et al, 2000

## Methodology

*The methodology applied in this study will here be explained in terms of research paradigm as well as practical approach. Issues related to limitations and validity will also be discussed.*

### Scientific approach

As previously mentioned, IT infrastructures are socio-technical systems that are based upon (and defined by) the situation in which they are applied. Therefore, adopting a scientific paradigm that takes contextual factors into consideration seems not only plausible but also a prudent course of action since the purpose is not to study professionalism itself, but rather its effects in an complex environment – that of healthcare. Furthermore, though the locality of the field work is secondary or even tertiary to the professional field(s) being studied, it can by no means be ruled out that legislation, tradition<sup>12</sup> or even language<sup>13</sup> may influence findings. A qualitative research approach is therefore called for in order to properly take into account the potential impact contextual factors may have on collection and interpretation of data.<sup>14</sup>

Furthermore, the aim of this paper is not to measure and evaluate as much as it is intended to bring about a deeper understanding of the interaction of two professional fields and whatever impact a specific quality, *professionalism*, has on this relationship. It is unlikely that any study based on quantitative measures, such as questionnaires, will fully illuminate the intricacies of multidisciplinary phenomena such as IT infrastructures. The best one can hope for is information regarding monetary and technical aspects of artifacts or a basic understanding of an information system by means of a constructed metric.<sup>15</sup>

Given the circumstances and intentions of this study, a qualitative approach based on a *constructivist* perspective<sup>16</sup> was applied. An inductive mode of research was adopted with a basis in understanding rather than testing any specific hypothesis.<sup>17</sup> The researcher selected a number of medical institutions that constituted the focus of in-depth case studies. As the researcher is not himself a medical professional, his means of collecting data is restricted to passive observation and interviews. Data related to each case was collected on site (i.e. the care facility in question) as far as this was possible in order to gather data not only by means of questions but observation as well. On-site experience may not only give rise to avenues of inquiry to pursue, but also increase understanding of the facility which is beneficial to an accurate depiction of the individual case itself. It may also increase the researcher's general understanding of the commonalities of the professional environment being studied – healthcare. Both of these effects combine to equip the researcher with a measure of tacit knowledge that will aid in subsequent correlation and analysis of data.<sup>18</sup>

Although the researcher applied constructivism in the research, a study being conducted in Japan from a western perspective runs the risk of being misrepresentative if proper care is not given to cultural perspectives and idiosyncrasies. This may be true of just about any culture, but as Japan is considered<sup>19</sup> a high-context society where any exchange presupposes a high degree of implicit knowledge, it is certainly a factor in this study. Any exposition of contextual peculiarities will

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<sup>12</sup> Hedberg, 1980, p. 36-38 / Holtman, 2009 / Rachlin et al., 2002

<sup>13</sup> Wallén, 1993, p. 77-78

<sup>14</sup> Wallén, 1993, p. 80-81

<sup>15</sup> Bannister & Remenyi, 2003 / Renkema & Berghout, 1997

<sup>16</sup> Wallén, 1993, p. 49-52 / Creswell, 2009, p. 8-9

<sup>17</sup> Wallén, 1993, p. 47

<sup>18</sup> Wallén, 1993, p. 76-79 / Creswell, 2009, p. 183-190

<sup>19</sup> Matsumoto, 1988, p. 7



therefore require a more *hermeneutic*<sup>20</sup> than constructivist perspective as the researcher would need to interpret and explain these instances in a way that is clear to anyone not familiar with Japanese language or society.

## Practical approach

Prior to embarking on practical studies in the field, an initial study of available literature was undertaken. Literature was mainly acquired by means of various academic databases such as JSTOR and ScienceDirect. The search criteria was formative in so far as various permutations of relevant keywords like *healthcare*, *information system*, *IT* or *professionalism* were applied. Literature attained from databases was supported by selected textbooks previously utilized by the researcher in his academic work.

Even though special consideration was given to literature written in a Japanese context, the amount of readily available published literature was insufficient to provide an ample and current perspective on Japanese healthcare. Therefore, as a preliminary (or in some cases concurrent) step to case studies, a number of interviews were conducted with individuals familiar with healthcare in Japan, medical IT or healthcare in general on an abstract level such as national policies and general technical challenges. This was done in order to create a conceptual “map” for the researcher which served several purposes. This map helped limit the scope of the literary study to topics that were relevant or plausible. It was also instrumental in shaping the themes and topics to address in later case studies. One can thus view this intermediate step as a figurative lens to help shape and focus the following steps of the research.

The selection of facilities for in-depth case studies was limited in two ways. First, the researcher was for practical reasons limited to the Tokyo area. Even though densely populated and in most ways the center of political and economic power in Japan, it constitutes only a small part of the country. Second, arranging visits to medical facilities proved difficult and time-consuming. In some cases the language barrier was insurmountable as access to staff that can communicate in English is limited. At other times the hospital staff were simply too busy to accommodate visits and interviews. The end result was that the simple quality of *availability* proved much more influential than any other properties which the health care facility possessed.

The division of empirics into two distinct phases also to some extent mirrors the diversity of actors affected by the topic in question. The individuals interviewed in the first phase are all experienced in their respective fields, but they were interviewed in their capacity of policymakers who operate mainly on the higher levels in their respective organization. Considering Actor-Network Theory<sup>21</sup> (ANT), which states that every actor (individual, group, standard etc.) present in a system affects each other in ways much more elaborate than an organizational chart suggests, there is no guarantee that the forces at work on a policy level are valid or even discernible on the implementation level, i.e. in a healthcare facility. Simply lumping respondents into either high-level (initial interviews) or low-level (case studies) is an extremely crude application of ANT, but it carries the benefit of contrasting any divergence all the more clearly. Interviewing policy-level actors can therefore not only serve to guide the researcher in his efforts, but has the potential to highlight any and all differences in perspective and motivation et cetera between the two groups.

An unexpected and unfortunate limitation to the majority of cases studied is the lack of access to medical professionals. Despite the researcher's best intentions, securing access to medical professionals was exceedingly difficult due to their workload. Access to medical facilities was therefore for the most

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<sup>20</sup> Wallén, 1993, p. 33-35

<sup>21</sup> Monteiro, 2000

part limited to managerial and to some degree technical staff, facilitating what can be described as a *holistic* rather than reductionist perspective of the facility and its internal workings.

The adoption of qualitative case studies severely limits the potential universally applicable conclusion regarding the role of professionalism in IT and healthcare. However, in an effort to relate to general trends in the fields of IT and healthcare, reports and academic papers regarding the situation in other areas (such as Sweden) were given due notice. Also, as qualitative research is to some extent emergent and inductive<sup>22</sup>, there is a certain amount of reciprocity between theory and data. Theory guides the method of collecting data, but acquired data may also spur further review of literature.

Lastly, In terms of arranging interviews and visits to healthcare facilities, the researcher was given aid by the Science & Technology office of the Embassy of Sweden in Tokyo, Japan. Having the aid of an institution like the embassy opened several avenues which would otherwise be closed. Without their assistance, it is very likely that this report could not have been written.

## Reliability

As a series of case studies on professionalism conducted in the area surrounding Tokyo, there are no guarantees that research conducted in Japan are valid for the relationship between IT and healthcare on a world-wide basis (or even Japan itself on a national basis). Indeed, a lack of commonality is considered one of the main drawbacks of case studies.<sup>23</sup> Any research into facilities outside of this area will be based on second-hand accounts or interviews conducted outside of the subject's professional environment. This is regrettable, but necessary for practical reasons.

Also, as was previously mentioned; lack of access to medical professionals led to an overall holistic perspective of the facilities covered in case studies. While this provided the researcher with an all-encompassing view of the organization and its level of divergence or convergence with general tendencies, it also limits the insight into individual parts of the case studied. For better or worse, most of the component parts of the organizations studied will therefore need to be considered "black boxes" which can only be appraised by means of their input and output.

Since this report is based on case studies, the validity and quality of the acquired data is largely dependent on the instances (in this case healthcare facilities) that serve as a basis for research. A few unusual or deviant respondents in a large-scale quantitative study may simply be regarded as exceptions when data for dozens or hundreds of responses are correlated. A qualitative study, based on a small number of cases, runs the risk of being to some extent misleading if one or more cases are atypical in some significant way. Making broad generalizations based on a qualitative study is therefore precarious at best.

In the actual collection of data (through interviews and/or observation) there is a well-documented phenomenon often referred to as the *Hawthorne Effect*.<sup>24</sup> This suggests that the behavior of the subject being studied changes if the study is carried out overtly. In other words, the researcher affects the outcome of the case study simply by his or her presence if the subject is aware that it is being observed. In this case, the research is carried out by someone who is neither a medical professional nor a Japanese national. Indeed, it has been suggested<sup>25</sup> that Japanese organizations are very careful in

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<sup>22</sup> Creswell, 2009, p. 175-176

<sup>23</sup> Creswell, 2009, p. 190

<sup>24</sup> Burnes, 2004, p. 57-60

<sup>25</sup> Matsumoto, 1988, p. 66, 87

maintaining a strict *tatema* (loosely translated: outward image) when dealing with outsiders. One can therefore not rule out the possibility of window-dressing for the sake of keeping up appearances.

Also, even though qualitative methods provide certain benefits when studying phenomena that are dependent on their context, they are by definition hard to replicate. Repeating the same study with the same sources of data would perhaps yield similar results, but it is unlikely that they would be *identical*. The results can therefore not be said to be replicable in the strictest sense of the word.

## Theoretical framework

*In this chapter the literary underpinnings and theoretical framework is presented. The chapter is concluded with a brief summary of lessons from theory.*

### IT infrastructure

The concept of infrastructure is well-established. Roads, power lines, plumbing, railway lines et cetera all represent infrastructures that most of us utilize on a daily basis. Without them, life in any major metropolis would be unbearable if not impossible. The ability to access daily necessities such as food, water and electricity is indeed a fundamental issue that all of mankind require.

However, the importance of access to – and ability to exchange – information has also trickled into public awareness with technical advances like the telegraph, telephone, radio and television.

It is therefore no great surprise that the term IT infrastructure is often used to describe the underlying ability to exchange and process information.<sup>26</sup> In some cases, like the telephone system which relies on dedicated lines, the term is used in a literal sense. In other instances, like e-mail, the term is used more metaphorically as the ability to exchange electronic mail is in actuality an application of one or more underlying infrastructures, such as electrical wiring, computer hardware and optical fiber. E-mail has however spread to the point of ubiquity and can hence be used as an infrastructure for other services and applications.<sup>27</sup>

Whatever its nature or use, infrastructures serve as the basis for other applications. Roads enable the effective use of cars and trucks, plumbing supplies water and telephone lines enables direct communication where this would otherwise be impractical or impossible. Likewise, the IT infrastructure grants an organization or person new options – chiefly by offering increased communicability or information processing. For the purpose of this report, IT infrastructure can be considered a collective designation for everything that which enables an individual to access the information he or she needs.

On a physical level, IT infrastructures are typically a patchwork of hardware provided by different suppliers at separate occasions.<sup>28</sup> If not somehow coordinated it is highly unlikely that the individual pieces will be compatible. Since infrastructures are by definition persistent and nigh impossible to replace once established<sup>29</sup>, the importance of *standards* is paramount. Equipped with one set of accepted standards, any number of actors (companies, government agencies, individuals and so forth) can build systems that can interact with their surroundings – thereby becoming part of a larger infrastructure. Even if standards cannot be pinned down to a single set, a small number of variations can be compensated for by means of various *gateway* solutions with creates the illusion of seamlessness.<sup>30</sup>

The formation of standards – be they *de facto* or *de jure* – can therefore be a lengthy process with a multitude of technical factors as well as end-user requirements to consider.<sup>31</sup> Once in place they are difficult to alter or replace even when faced with technically superior alternatives. The as of yet unsuccessful attempt to make the transition from the inadequate but globally accepted *Internet*

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<sup>26</sup> Davenport & Linder, 1994 / Weill & Broadbent, 1998, p. 3-22

<sup>27</sup> Hanseth, 2000

<sup>28</sup> Hanseth et al., 1996 / Hanseth, 2000

<sup>29</sup> Davenport, 1994 / Hanseth, 2000 / Hanseth&Lyytinen, 2004

<sup>30</sup> Hanseth, 2000

<sup>31</sup> Hanseth et al., 1996 / Hanseth & Braa, 2000

*Protocol version 4* to the more modern *version 6* illustrates the persistence of established standards very clearly.<sup>32</sup> Thus, standards can be said to form the basis of any infrastructure – including those related to information technology.

## Perspectives on IT infrastructure

Within the realm of literature dealing with Information Technology, and the management thereof, there exist a large number of models for visualization, classification and evaluation of IT infrastructures. Classifying all of them would be a herculean task in and of itself, but suffice to say there is no shortage of perspectives and opinions. The concepts of *IT portfolio*<sup>33</sup> and *cultivation of IT*<sup>34</sup> represent diametrically opposed and extreme perspectives and will therefore suffice to illustrate views on management of Information Technology.

The IT portfolio as presented by Weill & Broadbent conceptualizes an organization's hardware and software in much the same way as one thinks of a stock portfolio. Investments in IT are based on the current & future requirements and strategic intentions. The pieces that form the IT infrastructure are perceived as individual blocks that can be removed and exchanged as needed with relative ease.

The first step in forming a suitable IT portfolio is determining what organizational capabilities your IT infrastructure must support in order to realize the overall business strategy. The authors offer four basic types of investment views: *None*, *utility*, *dependent* and *enabling*. Each one is also exemplified with a successful implementation from real life in order to provide support for situations that justify their adoption.

As the denomination implies, a *none* perspective on IT means that the organization does not treat the various pieces of hardware and software it possesses as an interconnected infrastructure. Individual organizational units or departments are left to adopt whatever solutions that they deem suitable to fulfill their needs. This decentralized approach may offer advantages to an enterprise which is diversified to such a degree that there are virtually no points of intersection between different business units and therefore little or no regular exchange of information. The organization may, however, find itself in possession of a number of poorly integrated or completely incompatible “information islands” should the need for integration arise.

A *utility* view on IT describes a situation where the organization does treat hardware and software as part of a common infrastructure, but does so for the sole purpose of achieving economies of scale. IT is recognized as a resource that is needed throughout the organization, but it is no more critical to business processes than electricity or plumbing.<sup>35</sup> Thus, the focus is simply to satisfy the basic requirements to as low a cost as possible. Standardization will therefore most likely be rigid in order to reduce the amount of maintenance and support required throughout the organization.

Organizations who adopt a *dependent* view on Information Technology not only perceive IT as an infrastructure, but as an essential part of the business strategy. Investments in hardware, software and services are made with a clear purpose in mind. In other words, the organization strives to make IT an integral part of its business strategy and thereby attain what is often referred to as *alignment*<sup>36</sup> – a condition where technology perfectly matches organizational requirements.

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<sup>32</sup> Wikipedia: *IPv6 deployment*

<sup>33</sup> Weill & Broadbent, 1998, p. 81-125

<sup>34</sup> Ciborra, 1997

<sup>35</sup> Carr, 2003

<sup>36</sup> Aerts et al., 2004

The last perspective on IT presented by Weill & Broadbent is dubbed *enabling* as it basically permits the organization a large amount of leeway – in terms of both goal and modus operandi. Simply put, investments are made in IT that are strictly speaking not necessary when they are acquired, but will perhaps one day prove valuable. For an organization to adopt this perspective, it would have to perceive Information Technology as an important resource in order to justify the relatively speaking large investments that this view entails.

The perspectives on IT presented by Weill & Broadbent implies two things: That the IT infrastructure is under some sort of central control (that may or may not be exercised) and that individuals are rational and strive for the common good of the organization of which it is a part. The first of these two statements is called into question by Ciborra<sup>37</sup> who states that control is, for lack of a better word, an illusion and that alignment is attained by coincidence rather than conscious effort. He maintains that any skill or technology (such as an Information System) can best be put to effective use if it is given time to mature – that is to say, to be fine-tuned incrementally and improved over time. This also gives users – both casual and expert – a chance to familiarize themselves with the system in question. Ciborra refers to this process as *cultivation* and maintains that it is not easily quantified or visualized, but a necessary step in order to fully utilize information systems and information technology.

This reasoning can be expanded into a broader juxtaposition between management models that are based on a *top-down* perspective such as the IT portfolio suggested by Weill & Broadbent and paradigms that assume an opposite perspective – sometimes referred to as *bottom-up*.<sup>38</sup>

These two extreme perspectives also tie in to the rationality of individuals. One may successfully argue that a top-down perspective makes perfect sense in a large organization where a holistic perspective is difficult to attain. Only from the top of the proverbial pyramid may one possess all the information required to make educated decisions regarding the structure as a whole.

However, Simon demonstrated half a century ago that decision makers are by no means rational despite their birds-eye view of the organization.<sup>39</sup> The separation between ideal and reality may start as early as in the understanding of a given situation. Human beings are not cast from a single mould, but everyone has their own knowledge base and thought process which is determined by a lifetime of experiences. Two individuals may therefore interpret the same situation in two very different manners.<sup>40</sup> If one were to present the same problem to a psychologist and an engineer, it is likely that they will interpret the situation based on their own experiences proceed accordingly. For a psychologist to think and act as an engineer is unlikely as they represent different fields of expertise. There are also situations where uncertainty or time constraints lead to situations where decisions are perceived as exceedingly difficult and undesirable by the individual (or individuals) charged with the responsibility. In this case, rather than making a decision based on one's own ability, the decision maker simply makes the same choice others have made in the same situation. I.e. pick the same supplier or invest in the same product.<sup>41</sup> The rationality of individuals is thusly bounded by their individual qualities or the circumstances in which they operate – hence the term *bounded rationality*.<sup>42</sup>

When considering IT infrastructure, bounded rationality may be viewed as an argument for the bottom-up approach in that the individuals at the bottom, that is to say those closest to the processes

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<sup>37</sup> Ciborra, 1997, 2000

<sup>38</sup> Monteiro, 2000

<sup>39</sup> Hedberg, 1980, p. 36

<sup>40</sup> Hedberg, 1980, p. 47-59

<sup>41</sup> Bikhchandani et al., 1998

<sup>42</sup> Hedberg, 1980, p. 36-38, 119

that make up the core of the enterprise, are the ones who truly know the business. One can therefore argue that they are in the best position to determine what support is needed from secondary technologies such as IT.<sup>43</sup> The upper echelons of management are further removed from the core processes and should therefore have less insight into the humdrum of everyday activities on which the organization depends. On the other hand, bounded rationality is a two-way street. Frontline workers may have a clear picture of core processes, but it is less likely that they have a comprehensive view of the organization as a whole.

As a secondary technology intended to facilitate communication (i.e. transfer of data) IT rarely pools in one area but permeates the entire organization. Hence the use of the term IT infrastructure as opposed to referring to it as the “IT box”. In other words, one of the defining qualities of IT is its ubiquity.<sup>44</sup> This level of diffusion usually (the *none* perspective mentioned above providing a possible exception) requires some sort of coordination which is certainly facilitated by having a holistic perspective.<sup>45</sup> This, in turn, is an argument for a more top-down oriented approach as organizational theory would have us believe that this is where one has the best chance of attaining a coordinated view of the organization as a whole.

Troublesome as it may be, one can therefore almost concurrently make compelling cases for bottom-up and top-down approaches to IT.

Despite the disparities between the two perspectives, there is some congruence as to the potential for difficulties when increasing or altering an infrastructure. Standards, as suggested above, provide an effective barrier for change once they are in place. This is relevant to the technical aspects of facilitating communication as well as the structure of the data itself. The absence of standards can also create challenges in that investing in new and untested technologies constitutes a substantial risk. Not everyone is willing – or able – to make that leap of faith.<sup>46</sup>

Last, but not least, there is also a human element involved as a shift in an infrastructure can conceivably affect a great many people who all have their own view of the world. Let us now turn to the management of the human elements of infrastructures and systems.

## Change Management

As suggested above, there exist at least two opposing perspectives on how to view an organization in terms of its IT infrastructure. The *top-down* perspective and *bottom-up* perspective represents extremes and as such can be further subdivided based on context or academic perspective.<sup>47</sup>

Furthermore, each and every one of us is limited in our cognitive abilities by our experiences, knowledge and values and we are therefore limited in our actions by our own *bounded rationality*.

In a state of arrested development, our various perspectives and rationalities may be a mute point as there is already a balance between the actors present in an organization and the agendas that they represent. Status quo is however seldom – if ever – the case in neither nature nor management. Indeed, in presenting a framework for change management, Enquist et al. states that “the very nature of management is continuous improvement.”<sup>48</sup> Somewhat more laden with grandeur, Burnes states that “it has become the accepted view that, for society at large, the magnitude, speed, unpredictability and impact of change are greater than ever before.”<sup>49</sup> Statements like these are akin to painting a very

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<sup>43</sup> Dedrick et al., 2003

<sup>44</sup> Dedrick et al., 2003

<sup>45</sup> Bate et al., 2000 / Peppard, 2001

<sup>46</sup> Hanseth, 2000 / Weill & Broadbent, 1998, p. 106-107

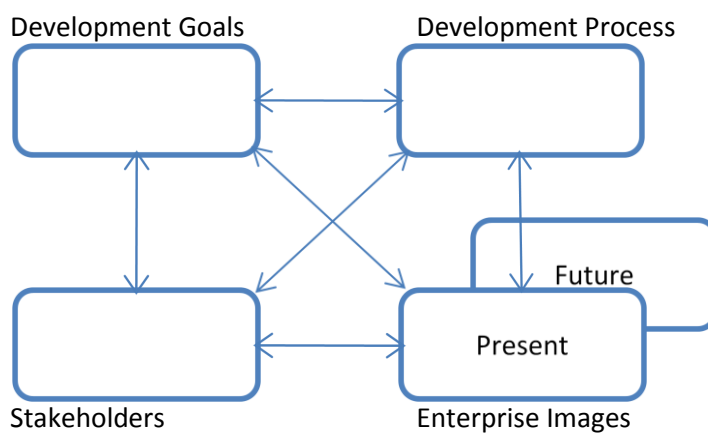
<sup>47</sup> Burnes, 2004, p. 142-163

<sup>48</sup> Enquist et al., 2002, p. 2

<sup>49</sup> Burnes, 2004, p. 1

rough sketch consisting of broad strokes without much detail depicting the world as it is perceived. The message is however clear: things will change whether you want them to or not.

There is no shortage of literature on change management. As of June 1<sup>st</sup> 2010, a search for the phrase “change management” in a scientific database like ScienceDirect yields over 5000 hits. However, for the purpose of this report, a review of the DELTA Meta Architecture<sup>50</sup> will suffice for two reasons. First, it is a high-level framework purposefully devised not to preclude the use of other theories or more pragmatic models. It does therefore not conflict with theories presented thus far, but rather encompasses them. Second, it does not assume that we are all rational, but rather acting based on the information and knowledge at hand. In other words, it is aware of the limits of human rationality.



DELTA Meta Architecture. Enquist et al., 2002

Simply put, the DELTA Meta Architecture consists of four parts: *Development goals*, *development process*, *stakeholders* and *enterprise images*.

The *enterprise image* has two dimensions – present and future. The former expresses where the organization is today and the latter the future vision. The gap between the two expresses the change that is required. This gap is also what gives the model its name as *Delta* ( $\Delta$ ) is used in physics and mathematics to signify change or alteration.

The *development goals* are projects and undertakings which will bring the enterprise closer to its intended future image. Unlike the future image, which is basically a long-term vision, the development goals need to be concrete enough to allow measurement and structuring.

The *development process* expresses the manner in which development goals are implemented. This can be a rather heterogeneous collection of activities ranging from local meetings to enterprise-wide conferences, weekly evaluations to unique “kick-off” events.

Last, but not least, the *stakeholders* who are made up of anyone involved in or affected by the change which the organization is undertaking. This encompassing definition carries with it the implication that the number of stakeholders may be vast.

<sup>50</sup> Enquist et al., 2002



Being a high-level model, the “boxes” specified in the DELTA Meta Architecture are somewhat unspecific. Their content will more often than not vary with each organization and each case of organizational change. The model presented in its generalized state by the authors is little more than a way to classify the basic components of change management. As with so many other models, behind the neat and tidy symbols lurks a reality which may well be exceedingly difficult to label.<sup>51</sup>

Equally important, or perhaps even more important, is that these components are all interconnected (as indicated by the arrows in the illustration). Alterations in one “box” will unavoidably influence all other aspects of the organization as well. In that sense, an organization is better described as a coherent web than as discrete pieces of a puzzle.

Using an example relevant to the context of this report, *stakeholders* are by definition a very heterogeneous mixture of individuals or even institutions. As mentioned above, stakeholders are a collective designation for everyone affected by a change. Depending on the size of the enterprise and the magnitude of the change effort, stakeholders can be restricted to one functional unit within a single organization or swell to encompass an entire organization plus a number of external parties such as subcontractors, customers, government, special interest groups etc. The larger and more diverse the groups of stakeholders become, the more unlikely that they have a similar perspective on neither the organization (present or future) nor the change at hand. Bounded rationality, personal opinion and professional interest are just a few factors that may influence one’s perspective and motivate one to act accordingly. The actions in question can in a worst case scenario be directly counterproductive if a stakeholder’s interests do not conform with the overall change effort.

Literature suggests that it is therefore important for the leader(s) of a change effort to not only have the authority to affect change<sup>52</sup>, but also properly anchor intended reforms among those affected by them – the stakeholders<sup>53</sup>. Failure to do so may result in not only *emotional* concerns such as lack of commitment or unease among the stakeholders, but also *knowledge* problems amounting to change efforts that are simply erroneous or not suitable in the intended context.

Other issues, such as those relating to the relative power of various stakeholders may also play a part in organizational reforms. If the change involves closing down facilities resulting in loss of employment opportunities, then there may be stakeholders who wish to arrest the development or propose an entirely different course of action. The sale of SAAB Automobile during the winter of 2009-2010 which involved not only buyer and seller but also vehement employees, Swedish government and the European Union illustrates quite clearly the complexities that a major change can bring about.<sup>54</sup>

Certainly, any hope of managing change requires a holistic perspective in order to balance the myriad of issues, problems or even opportunities which are brought about by upsetting the status quo. However, organizations can be expected to consist of individuals with different areas of expertise, or at least expertise earned in different manners. It is therefore no surprise that cooperation and dialogue is required among stakeholders in order to establish a shared image of the situation at hand. It has however been suggested that inter-professional communication is not without its trials and tribulations.

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<sup>51</sup> Ciborra, 1997

<sup>52</sup> Kotter, 2007

<sup>53</sup> Hedberg, 1980, p. 61-85

<sup>54</sup> Dagens nyheter: *Kronologi: Från GM till Spyker*

## Professionalism

One definition of the concept of *profession* describes it as “a vocation with a body of knowledge and skills (expertise) put into service for the good of others; the welfare society.”<sup>55</sup> A profession is in other words defined by the expertise its practitioners possess.

The construct of *professionalism* is however perceived as ambiguous and more dependent on context.<sup>56</sup> Terms such as sense of *identity*, professional *pride* or the perceived *status* of the profession are sometimes used to describe the level of professionalism. The level of *training* needed to enter the profession and the contributions of its practitioners in the world of academia may also be important factors. By these standards, medical practitioners possess a very strong sense of professionalism as their trade affords them a strong sense of identity and skills that command much respect from their environment.<sup>57</sup> Professions are however abundant in a wide variety of environments and not all of them are imbued with a strong sense of professionalism. IT-professionals, for example, possess a low amount of professionalism as their tasks are usually secondary in nature.<sup>58</sup> Their profession therefore rarely leaves tangible results to be recognized by those outside their own clique.

In terms of interactions or coordination between two professions, literature suggests two basic types of possible issues: *Technical* and *normative*.<sup>59</sup>

*Technical* issues are consequences of gaps in expertise or any other form of know-how which is closely related to the knowledge problems that may arise from poorly anchored change efforts. Most professions work with their own nomenclature that is established and accepted within their own group. In expanding the working environment to include multiple areas of expertise, one might however find that certain terminology or even fundamental concepts that are common knowledge in one group may be incomprehensible to others.<sup>60</sup> Even if the individuals who intend to coordinate their efforts are within the same general field, there may still be difficulties in communication. The sheer number of professions and academic areas is ever increasing, often leaving the individual with an ever narrowing area of expertise.<sup>61</sup>

If the knowledge gap between individuals working together increases beyond sub-grouping into a mix of very different disciplines, such as engineering and medical care, the difference in perspective may increase beyond nomenclature and into more basic assumptions. An engineer might utilize prototyping and trial-and-error as a basic modus operandi whereas the medical practitioner rarely has that option. Thus, a technical issue may manifest itself in that the professional is unable to understand something, or make him/herself understood, due to one's areas of expertise. This is a rational consequence of differences in experience, knowledge or available information.

Technical issues are based on the assumption that the individuals participating are motivated to work together to the best of their ability towards a common goal. This perspective is closely attuned to the notion of the rational decision process<sup>62</sup> where the solution of any issue or problem is merely a matter of time and effort. Rationality is however an ideal not easily attained. Multidisciplinary efforts can be

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<sup>55</sup> van Mook et al., 2009, p.81

<sup>56</sup> Ginsburg et al., 2000 / Holtman, 2009

<sup>57</sup> van Mook et al., 2009

<sup>58</sup> Dunleavy et al., 2006

<sup>59</sup> Holtman, 2009

<sup>60</sup> Holmqvist & Enquist, 2003 / Enquist & Makrygiannis, 1998

<sup>61</sup> Hedberg, 1980, p. 47-59

<sup>62</sup> Hedberg, 1980, p. 35-37

impeded not only by a knowledge gap, but rather unwritten rules or codes of conduct.<sup>63</sup> This type of barrier can be described as a *normative* issue as the problem stems from behavioral norms within the profession or culture.<sup>64</sup> These issues bear some resemblance to the emotional concerns that may arise in poorly managed change efforts. If the issue is related to the profession, then the problem might be described as one of prestige not being fulfilled. Pride and status are, as mentioned above, two integral elements of professionalism. Cultural influences can stem from a locality or an organization and can supersede artifacts of the business such as rules and formalized systems, making contextual factors an important factor along with profession.<sup>65</sup>

Strong professionalism or a context disinclined towards exchange yields social barriers inhibiting movement outside one's professional circle. It may even compel individuals or groups to spend time and effort in reinforcing what they perceive as their own professional boundaries towards other professions.<sup>66</sup> This manner of social fragmentation may well prove a greater impediment to multidisciplinary undertakings than any knowledge-gap ever can as there is a lack of volition effectively undermines any cooperative effort.

Normative issues may manifest as a situation where the professional is unwilling to cooperate due to perceived infringements on professional status. The motivation for this is somewhat hard to elucidate as it relates to norms and unwritten rules.

### **Professionalism, IT and change efforts**

As previously shown, professionalism essentially has a *technical* and a *normative* dimension. Either of these, left unchecked, can have serious consequences.

In technical terms, professions are defined by their expertise. It therefore follows that any work that crosses the professional borders must overcome a potentially wide gap in knowledge and experience. In contrast to expertise which can to some degree be compartmentalized, IT is usually a secondary function, yet present in all parts of an organization.<sup>67</sup> Its ubiquitous nature demands a coordinated effort which in turn demands the cooperation and consensus of functional areas of an organization. These functional areas may have very little to do with each other during their daily operations, but belonging to the same organization it is possible, if not plausible, that they utilize the same IT infrastructure and as such will need to agree on the nature of a number of issues. This can be likened to standardization, if only on a minor scale.

As mentioned above, literature also suggests the general perspective that professionalism can give rise to normative issues that may be anything but rational. Holtman<sup>68</sup> describes how vastly diverse domains as healthcare and armed forces essentially suffer from the same condition: Professional subcultures where the individuals place their own expertise, experience and judgment above written regulations. Usually, this involves the expert in question to deal with a situation based on his local perspective rather than globally (organization-wide) prescribed rules. In some cases, the division into subcultures may include behavior that intentionally sets one group apart from others and simultaneously limits access to the subculture by outsiders.

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<sup>63</sup> Ginsburg et al., 2000 / Holtman, 2009

<sup>64</sup> Burnes, 2004, p. 169-173

<sup>65</sup> Burnes, 2004, p. 169-173 / Holtman, 2009

<sup>66</sup> Magnusson, 2010

<sup>67</sup> Dedrick et al., 2003

<sup>68</sup> Holtman, 2009

In a situation where two or more professions come in contact with one another, issues of dissimilar practices can be overcome if there is a common will to do so. A common framework and/or vocabulary can be established as a “map” for the organization through which differences in perspective held by professionals (or other stakeholders) may be overcome and technical issues resolved. If, on the other hand, working with another professional group gives rise to a normative issue or diminished prestige, then there simply is no inducement for the collaborative effort in which case progress will in all likelihood be slow at best with both sides attempting to maintain their independence.

In the presence of either strong normative influence over professional conduct or a complex environment with profound technological gaps, the example set by the Delta Meta Architecture shows us that a coordinating force maintaining a holistic perspective is propitious in properly *anchoring the effort* with involved parties – either passively (build what you think they want based on second-hand data) or actively (involve end users directly). Literature also shows us that this coordinating force needs to be imbued with a sense of leadership and authority in order to be efficacious.<sup>69</sup> A coordinating force which fails to maintain a holistic perspective or lacks authority would ultimately result in the construction of potentially business-critical systems with limited or no input from those who possess the most valuable information – the end users.<sup>70</sup> This, in turn, can be expected to result in “information islands” which individually may serve their purpose, but collectively lack coherence and are able to exchange information in an ineffective manner at best.<sup>71</sup>

Tersely summarized, theory conveys the following points with regard to professionalization, IT and change efforts.

**Anchor the effort.** The first step to any change effort is motivating the stakeholders and conveying the necessity of change and the benefit(s) of the new order of things. Without motivation, it is unlikely that anyone will make the effort to overcome functional constraints and share the knowledge and expertise across organizational borders. This point relates to not only change management, but the normative aspect of professionalism as well.

**Maintain a holistic perspective.** Theory tells us that change management is a complicated issue with many variables to balance and stakeholders to placate. Not only that, but it also has to be carried out as a concomitant effort. Coordination and to some degree leadership is therefore required not only in order to make progress, but also to end up with a result that benefits the enterprise as a whole.

**Bridge the technological gap.** Bounded rationality tells us that differences of perspective are plentiful and in complex environments even more so. Even if properly motivated, differences in expertise and experience may create profound impediments to any exchange across functional and theoretical borders. Establishing some manner of common middle ground is therefore essential. The ability for interdisciplinary efforts is relevant to the technical aspect of professionalism.

**Give credit where credit is due.** The individual’s professional identity must not be perceived to be encroached upon by other fields of expertise or functional areas of an organization. If an individual feels that it is not in his or her professional pride is being recognized, then disinterest or even resentment may ensue carrying with it covert circumvention or overt challenges. Recognizing professional pride may however be difficult to those who are unaware of the unwritten rules and norms which guide the professional.

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<sup>69</sup>Hatch et.al., 2006 / Kunert & Lewis, 1987

<sup>70</sup> Checkland, 1989 / Magoulas & Pessi, 1998, p. 130-139

<sup>71</sup> Kotter, 2007 / Magoulas & Pessi, 1998, p. 34-46

**There is no one correct IT infrastructure.** Each approach to IT is imbued with its own qualities that make it more or less appropriate given the circumstances and motivation which prompts its introduction. Being a secondary technology its main purpose is to support other activities, one can with any degree of certainty state that contextual factors determine what may be considered appropriate or not. The view on IT may also be relevant as it indicates to what degree the professional comes in contact with it in his occupation.

## Preliminary study

*The preliminary study which serves as a preparatory step to case studies will be detailed here. The individuals interviewed will be briefly introduced followed by a summary of themes from their collective statements.*

As context is of great importance when studying professionalism, a number of interviews were conducted for the purpose of establishing a background and an understanding of contextual factors that might be of relevance.

Apart from the researcher and the interviewee(s), an additional two individuals were present in most instances. The first attendee was a fellow student conducting research on healthcare in Japan unrelated to this study. The second individual was one of the technical attachés to the Embassy of Sweden in Tokyo, Niklas Kviselius (Dr.Sc.). At the time, Dr. Kviselius was gathering material for a study<sup>72</sup> on *eHealth* in Japan in a professional capacity, and as such arranged the majority of the interviews in question.

All interviews were constructed in a semi-structured fashion with eHealth and IT in healthcare as two overall themes. Despite varying interests intersecting at a single point in time, everyone present at the interviews was given ample opportunity to ask questions relevant to their own research. Most of the interviews took between 50 and 70 minutes and data was recorded primarily by means of handwritten notes that were subsequently typed out and cross-checked in order to verify their validity. Notes from all interviews are attached to this report as appendices.

## Respondents

In the brief presentation of the respondents below, each one has been assigned a number. This number is based solely on the chronological order in which they were interviewed and bears no significance other than identification in the following portions of this report.

- (1) **Shigekoto Kaihara** (M.D., Ph.D.) has been active in the field of medicine for over 40 years and has been actively researching hospital information systems for 20 years. At the time of the interview, he was serving as the vice-president and dean of the graduate school at International University of Health and Welfare. The interview took place in Dr. Kaihara's office in Tokyo on February 2<sup>nd</sup>, 2010.
- (2) **Sadahiko Kanô** (Dr.Eng.) has over 30 years of experience working at NTT Laboratories. Since leaving employment at NTT, he has conducted research into communication/network engineering and medical systems. At the time of interview, he was a regular professor of the graduate school of Asia-pacific studies at Waseda University in Tokyo. He was also affiliated with several other universities, including serving as visiting professor at the University of Edinburgh and adjunct professor at the University of Texas. The interview with Dr. Kanô took place in his office at Waseda University in Tokyo on February 8<sup>th</sup>, 2010.
- (3) **Naoki Ikegami** (M.D., M.A.) has over 30 years of medical experience. He has served as advisor to both the World Health Organization and the World Bank. He has also published extensively, most notably in the field of medical economics. At the time of interview, he served as professor and chairman of the Department of Health Policy & Management at the School of Medicine, Keio University, Tokyo.  
**John Crichton Campbell** (Ph.D.) carries the titles of Professor Emeritus of the Department

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<sup>72</sup> Growth Analysis, 2010

of Political Science, University of Michigan. He is also a visiting professor at the Department of Health Policy & Management at the School of Medicine, Keio University, Tokyo. He has studied insurance policies and Japan-US relations since the 1970's.

Dr. Ikegami and Dr. Campbell have jointly published papers and books on the topic of health care in Japan on several occasions. They were jointly interviewed in Dr. Ikegami's offices at Keio University in Tokyo on February 25<sup>th</sup>, 2010.

- (4) **Michio Kimura** (M.S., M.D., Ph.D.) has over 20 years of experience from the fields of medicine and information engineering. He has previously been a visiting professor at University of Tokyo and University of Tsukuba. He currently serves as professor and director of the Department of Medical Informatics at Hamamatsu University School of Medicine in Hamamatsu. He also serves as chairman of Health Level Seven (HL7) Japan and the Committee of Standardization, Japan Association of Medical Informatics (JAMI). He is also a member of the Committee for Standardized Electronic Medical Records under the Ministry of Health Labor and Welfare and the Committee for Mutual Cooperativeness of Electronic Medical Records, Ministry of Economy, Trade and Industry. The interview with Dr. Kimura took place at a café in Ueno station, Tokyo on April 6<sup>th</sup>.
- (5) **Gösta Malmer** (M.D.) has worked for many years and in several capacities in Swedish healthcare. Most notably, he held the title of Chief Executive of *NU-sjukvården* (several hospitals in western Sweden) and served six years (2001-2007) as Chief Information Officer (CIO) for *Västra Götaland* County. Having no experience of the Japanese context, the inclusion of Dr. Malmer in the preliminary study is based purely on his experience in working with information systems and professionals in a medical context. The interview was carried out by means of telephone on April 12<sup>th</sup>, 2010. In this case researcher conducted the interview without the presence of other researchers or interested parties.
- (6) **Mihoko Okada** (Ph.D.) serves as a professor at the Department of Health Informatics of Kawasaki University in Kurashiki city. Professor Okada has also a member of JAMI and has been involved in the certification process for *Healthcare Information Technologist* since its inception in 2003. This certification was created by JAMI in order to counter what they perceived to be a lack of communication between the fields of medicine and IT. The interview with professor Okada was carried out at the Embassy of Sweden, Science and Technology Office in Tokyo on April 23<sup>rd</sup>, 2010.

## Results

The preliminary survey was intended to set the proverbial stage for subsequent implementation-level (I.e. individual hospitals) studies. As such it was by definition exploratory in nature and the respondents were to a large degree free to call attention to what they, working primarily on a policy-level, felt were the predominant issues facing healthcare from an IT perspective. The majority of the respondents have many years experience of working with healthcare and/or medical informatics in Japan. The single exception to this state of affairs is Dr. Gösta Malmer who has a corresponding amount of experience from Swedish healthcare. The inclusion of Dr. Malmer may therefore seem somewhat incongruous with the overall context of the study. However, the context can in this case be considered two-fold: Healthcare and Japan. Of the two, Healthcare is the dominant as it is the milieu of the professions studied and according to literature a potent source of professionalism. The inclusion of individuals with experiences from the dominant context is therefore justified – provisionally.

The results of the preliminary study listed below are aggregations of statements from the interviewees that are relevant to this paper. The two-folded context warrants a broad division of data collected during the preliminary study. First, there is healthcare in a Japanese context which entails current situation, areas of interest, perceived challenges et cetera. Second, there is working with IT in a medical context. This second category is not limited to Japan and covers issues and requirements present in healthcare and how to manage them.

### **Healthcare in the Japanese context**

**Japanese healthcare is heavily regulated.** Specifically, increases in healthcare spending are curtailed through strict centralized regulation of compensation levels for all medical procedures and tests (3). Japanese citizens have universal healthcare whereby they pay a monthly health insurance fee plus 30% of the charges incurred from visits to healthcare facilities. These charges are established bi-annually on a national level. In other words, every two years the price for every medical procedure covered by the national health insurance is renegotiated and then applied to every hospital and clinic in the country without exception. These frequent negotiations consume a lot of time and effort, but have thus far kept medical spending in Japan at a very low level (1, 3).

**There is a clear focus on the economic aspects of healthcare in Japan** (3). This should not be interpreted as though Japanese healthcare is lacking modern techniques or facilities. To illustrate this point, Japan has a higher proliferation of Computer Aided Tomography (CAT) and Magnetic Resonance Imaging (MRI) scanners per capita than any other country in the world. However, diffusion of such equipment is due to the fact that healthcare facilities can claim relatively high levels of remuneration from their use. In other cases – such as EMR or other quality-oriented IT support where there is no such straightforward connection between investment and returns – the emphasis on controlling cost shine through. Another example of this is the low numbers of back-office workers such as clerks (1, 2). This leaves doctors with no other choice but to personally deal with the exceedingly complicated and time-consuming paperwork surrounding the claim-system. Point in fact; the bureaucracy surrounding the reimbursement process is so complicated that the initial introduction of computers into Japanese hospitals (several decades ago) was motivated by facilitating efficiency and reducing clerical mistakes (4). This mindset remains to some extent in Japanese healthcare to this day as one does not invest unless there is a clear financial justification (3). An example of this is the adoption of Computerized Physician Order Entry (CPOE) systems which were essentially used as an extension of the older systems that facilitated the reimbursement process.

**Healthcare in Japan is characterized by a strong supply-side orientation.** IT is no exception to this state of affairs (1, 2). There are about half a dozen major suppliers of software systems intended for use in healthcare facilities serving the Japanese market who tend to use their own proprietary technology resulting in a low degree of interoperability with systems from other developers. Furthermore, hospitals rarely have their own IT staff (1, 6). Therefore there is no one from the own organization tasked with maintaining the facility's information systems nor keeping track of information requirements. Instead, systems are purchased by suppliers as “off-the-shelf” packages and installed & maintained by the supplier's IT-staff. All know-how regarding the operation of the system thus remains in the hands of the supplier.

The combination of proprietary technology and lack of in-house technical expertise essentially puts the hospital or clinic at the mercy of the supplier as it is difficult to articulate one's needs without the necessary competence. Changing supplier is also troublesome as the technology (including the databases) are proprietary and therefore the supplier can charge exorbitant fees for converting data into a more accessible format (4).



**Medical practitioners have historically shown little interest in IT.** To some extent, this can be attributed to structural factors as a large portion of Japanese healthcare takes place in small privately operated clinics (3). There is simply no need to invest heavily in information processing if there is only one or two medical staff to take into consideration.

In larger facilities, when an extension to the long since established ordering system, Computerized Physician Order Entry (CPOE), made its appearance, it was initially met with skepticism by the medical practitioners (1). Only after spending some time getting used to the system and experiencing first-hand how the clerical duties became easier to cope with was CPOE finally accepted. To some extent, the moderate rate of diffusion of IT in healthcare is attributed to generational issues. Using medical information systems is not covered by medical training, but younger doctors have of course grown up using computers and find it easy to acclimatize when asked to work with an Hospital Information System (HIS) (2, 4).

**The presence or absence of proficiency in the field of IT is arbitrary.** Rather than to have designated IT staff, management seeks out medical staff that – in an unofficial capacity – possesses appropriate knowledge in the field of IT (1, 6). Hospital management then consults with these individuals when addition to, or alteration of, the Hospital Information System (HIS) looms. A conservative environment can easily result in a situation where the only thing driving change is external forces like government mandates or vendor upgrades.

Medical practitioners that do take an active interest in IT have joined to form the Japanese Association for Medical Informatics (JAMI) which by and large is made up of professionals and academics working on a voluntary basis to advance medical care in general and medical informatics in particular (4, 6). One of their more tangible activities is the establishment of the *Healthcare Information Technologist* certification. This was in direct response to the dichotomy present in the dearth of knowledge possessed by medical practitioners and IT practitioners regarding each other's fields of expertise. The Healthcare Information Technologist certification was therefore created to bridge the void and increase understanding regarding IT in healthcare. This certification is not the only one to consider the interaction between the realm of healthcare and other fields (the American Health Information Management Association also conduct cross-disciplinary certifications), but it is unique in its technical perspective (6).

### Healthcare in a general context

**Managing a complex environment requires a holistic perspective.** Healthcare is by no means an exception as it sees different areas of expertise and different perspectives intersect in order to serve a common purpose (5, 6). In working with professionals (like doctors) one runs the risk that a narrow perspective dominates the agenda. In other words, the focus may fall on the good of the few rather than the wellbeing of the organization as a whole which carries with it a significant risk of overall sub-optimization. Equally fraught with danger is constantly dealing with only the problems at hand rather than maintaining a long-term perspective (4, 5).

**Facilitating change requires a proper mandate,** and few changes require as much authority as the establishment of standards. Currently, the most acutely felt instance of this in healthcare is dealing with technical issues like information systems and data storage (2, 5). However, before the technical issues are properly dealt with it may be required to deal with standardization on more fundamental levels such semantics and diagnosis. The technology is there to facilitate healthcare, but it cannot do so if there is no common understanding of basic underlying facts and causalities (3). Standardization on such fundamental issues is however difficult to attain as it has to be carried out on a much grander scale than the individual healthcare facility. Standardization on such an all-encompassing scale does however represent a major undertaking with a large number of actors who may or may not be willing

to conform or compromise. Therefore, along with the previously mentioned holistic perspective, the authority to act and facilitate change is often required rather than to simply rely on the rationality and altruism of individuals (1, 3, 5).

**Input from end users is important.** Even though one should be wary of listening too much to any one individual (since this increases the risk of an all too narrow perspective), the development and adoption of information systems should always be carried out with the participation of the intended user. Healthcare is no exception to this rule (2, 5). What is perhaps somewhat unique to healthcare is the high status of its practitioners. They are “solo artists” (5) and as such by and large unwilling to spend time on mundane matter like information systems. There is simply put no prestige in improving IT support for the organization whereas inventing or refining a medical procedure yields accolades. Coaxing medical professionals to participate may therefore be difficult, but it is necessary as they are the only ones with the necessary experience and expertise.

A useful strategy in soliciting input is to adopt a modular implementation of large information systems. Rather than a full-scale implementation, one constructs and introduces one function at a time. This is not only cost-effective but also establishes credibility as results are tangible (without being overwhelming) (5).

## Method for analysis

*The practical method applied for analyzing the cases studied will be explained and then outlined in this brief chapter.*

I have previously summarized the essential points gathered from theory with regards to professionalization, IT and change efforts. Theory however also tells us to be mindful of contextual matters to which end a number of interviews have been carried out in an effort to deepen our understanding of both healthcare in the Japanese context as well as a more general perspective on IT in healthcare. In keeping with the constructivist perspective of this report, the points gathered from theory will in combination with empirical data collected through interviews serve as an analytical tool by which to describe the cases studied. The analysis can thus be considered three-pronged: Theory, Japanese context and medical context.

In utilizing qualitative methods, it is not the intention to evaluate or “grade” the individual cases studied but rather understand them and see if and how they have been influenced by professionalism. Nevertheless, in order to conduct a discussion in a structured manner, some conditions and precepts must be established. The analytical tool, in this case a synthesis of theory and empirical data, can consequently be equaled to a looking-glass rather than a score board. As such, the questions listed below are purposefully non-specific in order to facilitate a discourse rather than a clear cut grade or score.

### **How was the expense of introducing IT justified?**

As we have seen, the preliminary study indicates that healthcare in Japan is oriented towards conservative spending – a trend that has been continued for a long time. It is also characterized by heavy regulation, the effects of which include strict rules regarding compensation levels for treatment which are established on a national level. Working within this system, one can clearly see the return on investment when purchasing a piece of medical machinery, such as an MRI scanner. Investments in IT support (such as EMR) do however represent large investments while not yielding any direct financial benefits. Hence, the introduction of IT support must be justified by factors other than proceeds. Theory suggests that the motivation for the IT-investment will (or at least should) mirror the scope and ambition of the results. While not directly tying into the construct of professionalism, it does provide contextual information regarding the overall importance placed on information technology in the given case.

### **How involved are management in administrating and developing the facility’s IT infrastructure?**

Interviews indicate that medical facilities in Japan rarely have dedicated IT staff. Rather, it appears common to rely on medical staff assuming some of these duties as the need arise. Empirical data also suggest that vendors of HIS are highly influential in Japanese healthcare. They provide solutions which are standardized in the sense that they sell essentially the same package to multiple customers, but not in the sense that they are able to exchange information with other information systems. In contrast to this, both theory and empirical data suggest that change efforts require a holistic perspective and authority in order to effect purposeful change. Failure to evoke these qualities can result in either a change initiative with a very myopic perspective or failure to bring about any meaningful change at all. In the context of this report, a certain level of involvement from the managerial branch of an organization may prove beneficial in maintaining balance and preventing either technicians or medical professionals to monopolize initiatives as neither of them possess the full range of skills needed to develop an HIS.

### **How are end users (i.e. medical staff) invited to participate?**

Theory implies that input from end users (stakeholders) is important in any change effort. Empirical data suggests that this point is especially poignant in a medical context as motivating medical professionals to participate in IT-related initiatives may prove arduous. If care is not given to illustrate the potential benefits, then it is unlikely that he or she will want to give up their time or experience. It is not unlikely that some manner of persuasion or coaxing may be necessary in order to convince medical professionals to give up their time. But more importantly, credibility is important if the professional is to consider altering the modus operandi to which he or she is accustomed.

The interviews also tell us that there is strong vendor dominance in Japanese healthcare. Essentially, this boils down to companies interested in selling software packages, keeping know-how to themselves and charging hefty fees for any modification. While this does not preclude credibility (the supplier may well have an excellent system), it does mean that the professional's ability to influence the HIS is limited. It may therefore be more difficult to persuade them to take an active interest. This quandary is related to the normative aspects of professionalism construct.

### **How is dialogue between medical staff and IT staff facilitated?**

The issue of aiding communication between two fields of expertise is perhaps the most relevant issue with regards to professionalism. Not only in elucidating what, if any, objections professional groupings might have to working together, but also to what extent they are in fact able to collaborate. Theory tells us that the technical gap is a very real (and rational) barrier to any interdisciplinary undertaking. No matter how keen the participants, progress may simply be excruciatingly slow if there is no common frame of reference from which to proceed. If that is the case, then some manner of managerial intervention may well help establish foothold from where one can proceed.

Overcoming technical barriers may however prove a minor issue compared to dealing with normative concerns. Irrational issues like pride and unease are perhaps natural to all of us –professionals and laymen alike – but they are comparatively difficult to anticipate and resolve as they are linked to core values such as our very identity. Rational ability is therefore no guarantee for fruitful collaboration.

## Case studies

*The medical facilities visited and studied are outlined in this chapter. These facilities constitute the case studies on which the bulk of subsequent analysis is based.*

The second leg of empirical studies takes us from policy level to actual implementations and is made up of studies conducted at facilities where information systems are utilized in the working environment. A total of four cases were studied and will be presented in detail below. The case studies were conducted in a similar manner to the preliminary study in so far as data was recorded by means of taking notes and rather than rely on a fixed set of questions a more emergent approach was applied. The shape and form of the facility's view and implementation of Hospital Information System (HIS) exerted some degree of influence over the course of events as no two facilities studied are directly comparable. Applying a uniform set of inquiries would therefore be inappropriate as one would risk downplaying or even overlooking the peculiarities of the cases.

The case studies took the form of more or less formalized visits to the facility in question. In all instances, the researcher was accompanied by a second student (hence the use of the plural form *researchers* in subsequent portions) conducting research into Japanese healthcare unrelated to this study. Both researchers were given equal opportunity to observe and ask questions during the visits to each facility. Both researchers took notes which were then reviewed collectively in order to avoid omissions and misunderstandings.

Notes from all visits are included at the end of this report as appendices. It does bear mentioning that the visits included visceral elements such as walking tours, demonstrations of HIS and simple observations of the surroundings by the researcher. Notes are, in comparison, somewhat one-dimensional and do not capture the entirety of each visit, but rather presents a very parsimonious account of what was observed and overheard.

The healthcare facilities studied are four hospitals of various size and shape which are all located in eastern Japan. They are Kantô Medical Center NTT East Corporation, Kameda Medical Center, Tôkatsu Clinic and Tôgane Prefectural Hospital.

### **Kantô Medical Center NTT East Corporation**

Kantô Medical Center is located in Shinagawa ward in Tokyo. It is, as the name implies, owned by Nippon Telegraph and Telephone (NTT) Corporation and used to be exclusively available to employees of said corporation until 1986. In 2007, a survey conducted by a magazine listed Kantô Medical Center as the second most popular hospital in Japan. It has in other words succeeded in establishing itself as a popular choice for patients, a fact also reflected in the fact that most patients treated are not from the immediate area of the hospital. (Keep in mind that under the Japanese healthcare system, patients may elect to be treated at any hospital or clinic they wish.)

The visit took place on February 26<sup>th</sup> 2010 and on this occasion the researchers were accompanied by the technical attaché from The Embassy of Sweden in Tokyo, Niklas Kviselius (Dr.Sc.).

The visit lasted for approximately two and a half hours and included a presentation of the hospital itself, a walking tour allowing first-hand observation of many areas of the hospital and then concluded with a Q&A session after the tour. During the entire time we were guided by several individuals from the hospital staff including an interpreter who rendered assistance when this was required. Hosting our visit was the Chief Executive of the hospital, Dr. Chikayuki Ochiai. It should be pointed out that

according to Japanese law, corporations may own hospitals, but the hospital must be run by a medical doctor.

The visit started with a presentation of the hospital by Dr. Ochiai showing some of the history and services of Kantô Medical Center. After the presentation, which lasted about 20 minutes, we were invited to tour the hospital.

When touring the hospital, it was apparent that this is an affluent facility with rooms that bare a strong resemblance what you might expect from an expensive hotel. We were also shown how nurses use handheld Personal Digital Assistants (PDA) in administering drugs in order to avoid errors. Not only able to link patient with prescription, the underlying HIS (to which the PDS is connected) is also able to alert nurses if the drug which is about to be administered might cause adverse affects if mixed with other drugs the patient is taking.

Much time was spent observing the storage areas located in the basement floors of the hospital. By means of a sophisticated logistics system, utilizing barcodes and Radio Frequency Identification (RFID), the hospital had been able to significantly reduce its need for warehouses as well as reduce waste by making sure that supplies were used before its expiration date. This was made possible by linking tracking information to software in the HIS that held a record of where any particular shipment (i.e. box of supplies) was located, how long it had been there and how long it was still viable.

The same technology was used in handling medical samples from patients (blood tests etc.). Test tubes were labelled upon entering the system (when the patient gave the sample) and was then tested in a laboratory that operated much like an assembly line. A nurse scans the barcode on the sample an then the HIS keeps track of whom it belongs to and records the result of the tests. This system not only handles inpatients, but outpatients as well meaning that it has to handle several tens of thousands of patients per year.

The hospital has its own IT-staff consisting of altogether 20 individuals. When asked, they explained that they serve not only Kantô Medical Center, but through remote link assist several other hospitals owned by NTT as well. Updates to the HIS were said to be fairly frequent – approximately one per month. What is perhaps interesting to note is that even though all these hospital are owned by NTT, use systems supplied by NTT and were to some extent maintained by the same staff – they were not able to electronically exchange medical data.

The visit concluded with a Q&A session with Dr. Ochiai where we amongst other things discussed the relationship between doctors and the extensive use of IT at Kantô Medical Center. Dr. Ochiai explained that the hospital is in some ways a "showcase" for NTT Data. In the actual use of HIS, there are some doctors who are very interested and some that are indifferent. The former have to be "kept in line" by management in order to avoid limiting oneself to a one-sided perspective as doctors tend to suggest improvements based on their own particular needs.

## **Kameda Medical Center**

Kameda Medical Center is located in Kamogawa city in Chiba prefecture. This effectively puts it about two hours east of central Tokyo by train. Kameda Medical Center is unusual in that its history goes back well over 300 years. Medical practices have of course changed over time, but it has always been operated by a member of the Kameda family. The current Chairman of the Board, Dr. Takaaki Kameda, represents the 11<sup>th</sup> generation of his line to run a healthcare facility in that area. It should also be pointed out that Kameda Medical Center is not confined to one building, but rather spans several structures ranging from trauma center and rehab facilities to cafés and even a pet center.

The researchers' inquiries into Kameda Medical Center consist of two discrete instances, the first being an interview with Chairman Emeritus of Kameda Medical Center, Dr. Toshitada Kameda. This interview took place on April 4<sup>th</sup> 2010 in the Tokyo offices of Siemens Japan with who Kameda Hospital Group was at the time co-developing medical IT software. Present at this interview was besides the two researchers the technical attaché from The Embassy of Sweden in Tokyo, Niklas Kviselius. As a former Chairman of Kameda Medical Center, Dr. Kameda offered us a detailed presentation of the clinic, its history and the Hospital Information System (HIS) utilized at the hospital. The emphasis on HIS was not surprising given the fact that the meeting took place in the offices of Siemens – who is a major supplier of medical IT systems on several markets. (Japan is however not one of them.)

The presentation and subsequent Q&A session lasted for about 70 minutes and ended with an invitation to visit Kameda Medical Center.

This visit, in turn, took place on April 26<sup>th</sup> 2010. On this occasion the researchers were not accompanied by any representative from the Swedish Embassy.

The visit and opened with a demonstration of the current HIS used in the hospital. The demonstration was conducted by Mr. Akio Arai, head of the IT Department at Kameda Medical Center. Upon completing this demonstration and answering a few questions (approximately 30 minutes in total), Mr. Arai was called away on business and the remainder of our visit was orchestrated by Mr. John Wocher, the Executive Vice President of administration and Director of international services. This started with a Q&A session with Mr. Wocher lasting about 1 hour. Having been with Kameda Medical Center for many years, Mr. Wocher was able to provide some insights into the IT investments carried out by hospital management (amounting to about \$30 million between 1990 and 2000). The first version of the HIS was in development between 1990 and 1995 in cooperation with IBM. Kameda Medical Center was in some senses breaking new ground in doing this, which is a contributing factor to the lengthy development cycle.

An extensive use of, and readiness for, IT was essentially seen as an investment which only in recent years have fully matured. The effects are not primarily financial, but as an example, Mr. Wocher offered that Kameda Medical Center's fully paperless EMR essentially provides a "dashboard" by which management can at any time get an accurate picture of the status of various facilities. He continued to explain that if one were so inclined, this level of transparency could be used to directly reprimand medical professionals for performing poorly. Their policy has however always been to improve rather than to punish.

The second version of their HIS was launched in 1999 – this time developed in-house by their own IT staff.

An extensive reliance on computerized systems is however incumbent on them actually being used by the medical professionals. Mr. Wocher offered two basic strategies in accomplishing this.

*Tell them, don't ask them.*

*Don't offer any other options.*

The approach adopted at Kameda Medical Center was the latter, but Mr. Wocher also pointed out that the medical IT staff (50 people) is, like the doctors, on call.

After the Q&A, we were given a partial tour (lasting about 1 hour) of facilities available at Kameda Medical Center. Much like Kantô Medical Center, it was clear that Kameda Medical Center is exceedingly well-funded. Equally clear was that the comfort of patients is given a high priority. Apart from the restaurants, cafés and shops available in or very near the hospital, each room used by in-patients is equipped with a multimedia terminal from which the patient can order food, access news,

select programming (TV or movies) or review their own medical record. Mr. Wocher was very clear on pointing out that their view on EMR is “everything that the hospital can provide.”

While there was no opportunity to directly talk to any medical professionals, the researchers were given an opportunity to make a few inquiries to doctors (three in total) at the hospital. Their comments, although terse, conveyed that they initially had some difficulties adapting to working in a paperless environment. Now that they are used to it, they find it “mostly suited” to their needs and that they have a great level of influence over the development of the HIS.

## **Tôkatsu Clinic**

Constructed in the early 1970’s, Tôkatsu Clinic (or Tôkatsu Clinic Hospital to use the exact translation) is situated in Matsudo city in Chiba prefecture, about an hour by train from central Tokyo. Although it does provide a wide range of treatments, most of its efforts are focused towards dialytic treatment. To this end, it cooperates with a number of “satellite clinics” which even though are individually small, collectively can handle a large number of patients.

The visit took place on May 14<sup>th</sup> 2010 and in this instance, the researchers was accompanied by several individuals (one of whom served as an interpreter) from the Japanese Productivity Center, and non-profit organization which kindly assisted us in mediating contact with the hospital.

As the hospital staff was well aware of our interest in IT-related matters, much of the visit was purposefully directed towards this end. This was perhaps most clearly reflected in the fact that the researchers were received and guided chiefly by members of the IT staff rather than managerial staff. Representing the hospital were Mr. Tetsuo Yamada and Mr. Hiroyasu Tonosaki of the Medical Systems Department as well as Mr. Takashi Noguchi of the general affairs department.

We were initially given a presentation (lasting about 45 minutes) of the hospital with a clear focus on the HIS which had recently been upgraded and expanded to include full EMR functionality. What is somewhat unusual is that this system was extremely modular and comprised of about a dozen subsystems, most of which from different suppliers. These systems have then been integrated into a common interface forming the EMR. This approach enabled the hospital to over the past 15 years incrementally move towards EMR without having to discard any of their older systems or databases. This interoperability was, interestingly enough, implemented by having the systems communicate through simple text-files. As one member of the IT staff put it: “A bit old-fashioned, but it works and every system can read and write text.”

Following the presentation, a tour (lasting about an hour) was conducted demonstrating the implementation and utilization of IT in the hospital. A great number of mobile, as well as some stationary, workstations were available for staff to utilize. This was explained as a necessity since the hospital is now virtually paperless. The tour also allowed opportunities to ask a couple of nurses and a doctor regarding their thoughts on working with the HIS. Their impressions were positive, explaining that after the initial phase of getting to know the system, the advantages (compared to a paper-based system) were readily apparent. Especially as the HIS also in part extends to the satellite clinics allowing doctors to follow up on a patient even if he or she does not visit the hospital itself. They also felt that the IT staff is very responsive to their needs and any problems were usually solved within an hour or two.

The tour concluded with a rather extensive Q&A session (lasting about 45 minutes) during which Mr. Yamada and Mr. Tonosaki among other things explained that there was no budget established for the implementation of the EMR system. Some personnel from the medical systems department (two out of



five) were for a period of two years allocated to EMR efforts full-time. But as they are employed by the hospital this was not seen as an expense as their salaries remain the same regardless of duties. The only irregular expense was the software needed to integrate the sub-systems which cost approximately 5 million yen.

It was also made clear that the Director of Tōkatsu Clinic, Dr. Nakanobu Azuma, has been advocating the use of IT in healthcare for a long time. Upon implementing EMR, his message to the medical staff was simple: “Just start using it. We can change it if you don’t like it.”

## **Tōgane Prefectural Hospital**

The only non-incorporated healthcare facility included in this study, Tōgane Hospital, was constructed in the early 1950’s and is located in Tōgane city, Chiba prefecture, which puts it about 50 minutes from central Tokyo by train. In contrast to other cases brought up in this report, the focus here is not the hospital itself, but rather a regional undertaking which is centered on Tōgane Hospital. The undertaking in question is called Wakashio Network and allows (as of May 2010) 36 smaller clinics to connect to the central server which is physically located at Tōgane Hospital.

Before travelling to Tōgane city, an outline of the technical aspects – as well as a demonstration of the system itself – was given at the offices of NTT Data Corporation in Koto ward, Tokyo on May 10<sup>th</sup> 2010. Representing NTT Data at this meeting were Mr. Tomoyasu Tanaka, Mr. Kazunari Takahei and Mr. Takafumi Kimura. From a technical standpoint, Wakashio Network can be described as a thin-client system as very little software is required from the client side in order to connect and all data is stored centrally. Joining the network therefore represents a very low investment for clinics. This may have something to do with the fact that Wakashio Network was primarily funded by the Ministry of Economy, Trade and Industry (METI). Being a government funded project no doubt brings financial constraints and caveats. This is also reflected in staffing as NTT Data only has one technician maintaining the server on site. The presentation lasted for about an hour and was followed by a brief Q&A session.

Later the same day, the researchers visited Tōgane Hospital and were given yet another presentation of Wakashio Network by the Director of the hospital, Dr. Aizan Hirai. This time, the presentation focused on the background and purpose of the network.

In an effort to summarize Dr. Hirai’s presentation (which lasted for over 90 minutes), Japan has seen a large increase in diabetes over the past 20 years. Chiba ward is one of the areas hit hardest – not due to a higher frequency of cases, but by a lower concentration of doctors with expertise in the treatment of diabetes. Against this background, Dr. Hirai (along with a number of colleagues) came up with the idea for Wakashio Network. In essence, the concept can be put forth as an effort to turn the region (consisting of Tōgane Hospital and several dozen small clinics) into one large virtual hospital for the purpose of treating diabetes.

The core of this effort is an approach called Staged Diabetes Management (SDM) which was originally developed in the 1980’s. Basically, it’s a manual for the treatment of diabetic patients intended for non-specialized medical professionals. With the aid of SDM, diabetic patients can be treated at their local clinics rather than visit the one hospital which has staff specializing in their diabetes.

As a first step, diagnosis and division of patients into complicated and non-complicated categories is carried out at the hospital. The complicated patients can then continue to receive treatment at the hospital whereas the non-complicated ones can be treated by their local clinic. This serves to cut down

on travel times for patients and – more importantly – alleviates the work load for overworked diabetes specialists.

This effort would be impractical if not impossible to carry out on a large scale without adequate and accurate information regarding the patient's condition over time. This is where Wakashio Network makes its contribution as it enables specialized doctors to diagnose the patient at the hospital and then refer them to clinics where the non-specialist doctors can treat them and report back – through Wakashio Network – how their condition changes over time. The specialist can then monitor the patient and resume care should this become necessary. The task of monitoring patients is not something that has to be done manually, but is implemented into the system. If certain vitals do not conform to a prescribed range, then the proverbial alarm is sounded.

While implemented by NTT Data Corporation, the range of acceptable values for vitals was a part of a broad collaborative effort regarding SDM and Wakashio Network in the area surrounding Tôgane Hospital. According to Dr. Hirai, it was clear that action was needed in the treatment of diabetes, so medical professionals were motivated to discuss, develop and adopt both SDM and Wakashio Network. There was – in other words – a clear link between system and purpose.

Dr. Hirai concluded by stating that Wakashio Network currently has 3000 registered patients and while it is currently only intended for diabetic patients; it has clear potential for not only facilitating but also streamlining treatment of other chronic conditions as well.

## Analysis

*The medical facilities studied are here analyzed based on the framework synthesised from theory and preliminary empirical findings.*

### Justification for IT

Looking at the capabilities and extensive use of IT at **Kantô Medical Center NTT East Corporation**, it is clear that the Hospital Information System (HIS) represents a large investment. Not confined to servers and desktop computers, information is to a great extent accessed and collected by Radio Frequency Identification (RFID) and barcode. Governing information in this precise manner was said to be advantageous when considering patient security in that the risk for errors or misunderstandings are diminished.

Equal emphasis appears to be placed on logistics where, also using RFID and barcode, supplies were handled in a very streamlined fashion which reduced waste as well as the need to local storage facilities.

While patient safety and improved logistics are both important issues of the utmost importance, one should also take into consideration that the hospital is owned by Nippon Telegraph and Telephone Corporation (NTT), who is one of the biggest suppliers of IT (inside and outside the medical context) in Japan. Assuming that corporate image and pride are both factors affecting the level of investment seen at Kantô Medical Center is therefore not a huge leap of faith. This was to some degree confirmed by the Chief Executive, Dr. Ochiai, when asked whether the term “showcase” was applicable to Kantô Medical Center.

**Kameda Medical Center** also features an extensive and advanced application of IT. Initiating efforts to develop an Electronic Medical Record (EMR) system as early as 1990 and spending five years developing it is on the face of it hard to explain. Keeping in mind that the Japanese insurance system does not (neither in 1990 nor 2010) offer remunerations for the use of EMR makes the \$30 million spent by Kameda Medical Center seem even more perplexing.

However, having been operated largely by the Kameda family for many generations appears to have imbued management with a sense of identity and investments with a long-term perspective. The Executive Vice President of administration Mr. Wocher suggested as much when he explained that this was seen as an investment in the Kameda Medical Center. Hence, in this case the impetus for investment appears to have been commitment to the hospital itself.

While financially not as endowed as the aforementioned facilities, **Tôkatsu Clinic** also has a fully functional EMR system. In this case, the motivation for the initial introduction of IT (pre-EMR) was a need to support and coordinate efforts in dialytic treatment back in 1995. As no suitable system was available for purchase at the time, the decision was made to develop in-house. Thus, the purpose for introducing IT was clear and unambiguous.

However, the gradual development from isolated systems supporting functions like billing and dialytic treatment to an all-encompassing EMR was driven by the Director, Dr. Azuma, who had been advocating the use of IT in healthcare for many years. Or, as the staff from the Medical Systems Department put it: He has had a vision of IT in his hospital for a long time.

Wakashio Network based in **Tôgane Hospital** differs from the other cases of medical IT covered in this study in that the focus is not one medical facility, but rather a collaboration between many facilities. The collaboration was centered on one specific issue – diabetes – and the common consensus was that something had to be done. Staged Diabetes Management (SDM) provided the actual medical solution to the problem, but in order to implement it on a wide scale efforts had to be effectively coordinated. Wakashio Network – as proposed by among others the Director of Tôgane

Hospital, Dr. Hirai – provided a solution that showed promise in alleviating the situation. There was thus a clear purpose of introducing IT support in supporting SDM. Also, it bears mentioning that the project was financed by the Ministry of Economy, Trade and Industry (METI) which one can assume facilitated the actual realization of Wakashio Network.

### **Involvement of management**

There is some ambiguity regarding the involvement of management at **Kantô Medical Center**. As previously stated, the hospital is owned by NTT and no doubt valuable in exhibiting their technological prowess.

On the other hand, the Chief Executive, Dr. Ochiai, is himself a neurosurgeon with many years experience who has also published material on the benefits of using RFID-tags on surgical equipment.<sup>73</sup> Also, comments made by Dr. Ochiai with regards to keeping local initiatives from dominating the agenda suggest awareness of the need for a comprehensive perspective.

However, there is no support in empirical data to make any assertions one way or the other.

With its rich (and long) history, there is little doubt that the management at **Kameda Medical Center** is invested in the establishment's well-being. IT is no exception as they were indeed early adopters of EMR – essentially pre-dating the commercial availability of such systems. The hefty investment (both in terms of time and money) has only in recent years fully matured as a tool for not only patient safety but also patient satisfaction.

Investment is however only half of the equation as systems must be accepted & used in order to bring benefits. Management had to lead the way and adopted a fairly hard line on this issue, essentially assuming the position of “don't offer any other options” to medical staff. However, as long as doctors do use the HIS, Mr. Woche made it clear that medical staff have final say on all matters relating to healthcare issues and that he, as well as his colleagues, try to spend as much time with the staff as possible rather than sitting in an “ivory tower.”

Management were clearly involved in the shift to EMR at **Tôkatsu Clinic** – even though they did delegate the proverbial grunt work to the IT staff. In choosing between purchasing a HIS system or continue internal development efforts, the Medical Systems Department were tasked with listing the pros and cons of continued internal development. Based on this information, the decision was taken to continue in-house development as it allowed greater flexibility.

Furthermore, Dr. Azuma, who was one of the main drivers for the introduction and development of IT at his hospital, was also the first one to utilize it on a daily basis. In other words, he set an example for the hospital staff.

“Management” is a term not easily applied to Wakashio Network. While based in **Tôgane Hospital**, the network relies on the cooperation and consensus of the 36 clinics participating in the effort. Should one choose to define the heads of these clinics, as well as Dr. Hirai himself, as management, then the commitment is indeed palpable. The clearest indication of this is perhaps the voluntary nature of participation. While the project was funded by METI, there are no financial incentives for clinics to join the network. However, given that the currently participating 36 clinics joined Wakashio Network for the singular purpose of improving care for diabetic patients, it is unclear if and how it can expand to offer more comprehensive functionality.

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<sup>73</sup> Ochiai, 2009

## Participation of end users

While there are clear generational differences in the degree to which medical professionals are used to handle computer & keyboard as opposed to pen & paper, everyone at **Kantô Medical Center** is motivated to ensure patient safety. If coming to grips with IT will facilitate that, then it is worth the effort. That being said the level of actual interest is far from consistent within the medical staff. The ones that take an interest form IT teams that provide feedback and recommendations regarding the HIS at least 3-4 times per year. Beyond these teams the doctors and nurses are largely indifferent and use whatever is available.

While it is perhaps natural that not everyone is a computer “otaku” (Japanese slang meaning *geek* or *nerd*), this stratification of users runs the risk of creating overrepresentation of certain viewpoints while downplaying others. As previously mentioned, Dr. Ochiai appeared to be aware of this concern as he mentioned that local initiatives – usually championed by “otakus” – must not be given too much leeway.

As **Kameda Medical Center** were early to adopt extensive use of IT (such as EMR), the medical staff were initially sceptical and were unable to grasp the potential benefits of replacing paper charts with an electronic counterpart. However, during the implementation process (which was undertaken gradually) they came to understand the advantages that can be derived from IT support. In some cases tutoring was required, but those who had difficulties were encouraged by the progress made by younger colleagues.

Suggestions and recommendations for improving the HIS are submitted by committees. Empirical data does not offer any clear insight into the structures of these committees other than which are all chaired by doctors. The outspoken position of management, backed up by comments from doctors, is that medical professionals drive the development of the HIS and only rarely does management interfere. (When they do it’s usually for budgetary reasons.)

As previously mentioned, the Director of **Tôkatsu Clinic** adopted the EMR system himself before asking the same of medical staff. He did not order the staff to use the system (at least not overtly), but rather asked them to by saying: “Just start using it. We can change it if you don’t like it.” Basically soliciting input – of any kind – from medical staff rather than simply have them dismiss it out of hand. Leading up to this was the gradual adoption and introduction of the various subsystems that make up the EMR. As parts of the system were gradually introduced, staff members had time to adopt and make suggestions.

In general, efforts are constantly made to add functionality. An example of this is the various team-efforts that are undertaken at Tôkatsu Clinic. These are given their own workspace in the HIS in which relevant data is displayed in a manner which fits the members and purpose of the team.

As Wakashio Network is based upon a single issue which is of great concern to the region, the purpose of the undertaking is perfectly clear. To put it bluntly: You are either committed to the challenge posed by diabetes or you are not. As the IT support for Wakashio Network is essentially a thin client system which relies entirely upon the server stationed at **Tôgane Hospital**, very little in terms of investment is required from clinics who wish to join. (Basically, you need a computer with Internet access.) The interface is also purposefully kept simple which makes the learning curve very mild. In comparison, the medical aspects of the project may require a greater amount effort from doctors if they are unaccustomed to SDM.

The close tie between IT and its medical application combined with simplicity of use appears to remove the stigma of IT from the equation as it is clear that coordinating the effort by paper would be very impractical.

## Facilitating dialogue between IT staff and medical staff

As previously mentioned, members of the medical staff at **Kantô Medical Center** form IT teams that together with IT staff review the HIS 3-4 times per year. The normal modus operandi is for other medical professionals to submit their comments to these teams. As these IT teams tend to be comprised of individuals who are interested in computers and software, one can assume that they have an easier time communicating with IT staff than a doctor or nurse who is not interested in IT at all. (That assumption is however not directly supported by empirical data.)

The likelihood of direct communication with IT staff is also more likely for these IT teams as other medical professionals, as previously mentioned, tend to be indifferent. This lack of contact may be a cause for concern in that it limits the flow of information (i.e. feedback, suggestions etc.) within the organization.

Medical staff at **Kameda Medical Center** form IT committees who discuss issues related to the HIS. Representatives from these committees meet with representatives of the IT staff on a monthly basis. The proverbial pecking order of these meetings is determined by management in that the policy at Kameda Medical Center is that doctors drive the development of the HIS. The IT staff obliges and only raises an objection when there are major technical impediments to what is being suggested. “Which is as it should be as the IT staff works for the clinic” according to Mr. Wocher. Case in point, the IT staff is made up of 50 staff and they are – like doctors – on call. In other words, management makes sure that the communication between the professional groupings at Kameda Medical Center is usually – if not always – on the doctor’s terms.

In contrast to previously discussed cases, there are no formal monthly meetings where IT staff and medical staff meet at **Tôkatsu Clinic**. Rather, suggestions are gathered by the head of each department and sent to the Medical Systems Department. Suggestions are then divided into two categories: Those that are dealt with immediately and those that can wait. The former represent bugs or serious problems whereas the latter are requests that are not urgent.

This division notwithstanding, IT personnel respond quickly to the needs of medical staff. In the event of a problem or a question, medical staff simply picks up the phone and calls anyone from the IT staff. Many of the issues important to medical staff are relatively simple to accommodate technically, like modifying the user interface. This level of responsiveness would however have been very expensive should IT have been outsourced rather than maintained in-house.

As Wakashio Network is (technically speaking) relatively simple compared to the other cases discussed in this study, it is perhaps not surprising that the meetings between medical staff and IT staff (from NTT Data Corporation) are less frequent, usually every two months. There is also very little staff on site at **Tôgane Hospital** – usually just one technician. While also being related to financial issues, the simplicity of Wakashio Network does perhaps in its current form not necessitate any extensive dialogue or support. According to Dr. Hirai, the system was easy enough to use without any special training. “Training on the job” was quite enough.

Summary of analysis

	<b>Kantô Medical Center NTT East Corporation</b>	<b>Kameda Medical Center</b>	<b>Tôkatsu Clinic</b>	<b>Tôgane Prefectural Hospital</b>
<b>Justification for IT</b>	Improvements in logistics, patient safety, showcase for NTT	Long-term investment in hospital itself	Initially support and coordination, subsequently managerially driven	Coordination of “virtual hospital”
<b>Involvement of management</b>	Strong corporate influence as well as experienced management	Introduction of IT entirely management-driven	Management-driven based on assessment from IT staff	Broad consensus between participating facilities
<b>Participation of end users</b>	Based on interest	Managed through committees	Management leading by example	IT overshadowed by medical purpose and need
<b>Facilitation of dialogue</b>	HIS reviewed 3-4 times per year by IT teams	Committees convening on a monthly basis	Funnelled through conventional channels	Bi-monthly meetings

## Discussion

*Empirical findings relevant to this study are discussed in an effort to elucidate relevant issues. This is followed by a deeper analysis specifically pointing out findings relating to the construct of professionalism.*

### Summary of empirical findings

The preliminary study indicates that healthcare in Japan is relatively inhospitable to advanced applications of IT. A general disinterest by medical staff, absence of designated IT staff, vendor dominance and poor penetration of standards are all potent obstacles to widespread adoption of Hospital Information Systems (HIS) and Electronic Medical Records (EMR).

Japanese healthcare is in many ways a result of centralized regulation present in the national health insurance system. Aspects of healthcare that warrant remuneration are readily adopted by healthcare facilities regardless of size. Advanced IT support like EMR is however not compensated by the insurance system which – as healthcare in Japan is said to be focused on moderate spending – would suggest that any and all IT support adopted would be based on a *utility* view on IT. Essentially buying only what is needed as cheaply as possible.

In describing the HIS of Kantô Medical Center and Wakashio Network centered on Tôgane Hospital, empirical data suggest a *dependant* view on IT. In other words, the investments made are intended not only as a basic utility, but to provide essential support for organizational processes. At Kantô Medical Center, the HIS provides both EMR and support for an advanced logistics system – both of which require carefully planned support if they are to function with the degree of reliability required by healthcare. While not as advanced, Wakashio Network can also be described an investment made from the same perspective. The network is essential in order to coordinate Staged Diabetes Management (SDM) efforts, yet is kept simple enough not to deject prospective participants.

Kameda Medical Center is in the favorable position of being both independent and well-funded. Having invested heavily into IT and only afterwards gradually discovered and utilized its full potential makes for an *enabling* view on IT.

Tôkatsu Clinic is more ambiguous in that its modular structure provides a large degree of flexibility for future applications, suggesting an *enabling* view on IT. On the other hand, one can also see a *dependent* view in that gradual adoption allowed the IT support to gradually mirror organizational processes. As gradual adoption was perceived as a priority by IT staff and management at Tôkatsu Clinic, it is assumed that a *dependent* view on IT is the most suitable way to describe the impetus for IT.

As none of the cases studied match the utilitarian view on IT suggested by the preliminary study, the assumption can be made that these facilities are atypical for Japan. While this effectively eliminates the possibility to draw any conclusions on Japanese healthcare based on the cases studied, it does mean that all cases represent (relatively speaking) large-scale applications of IT support in healthcare. As such they all provide valuable insights into the promises and pitfalls of Information Technology in a medical context.

Theory as well as interviews suggests that a management – possessing skills such as a comprehensive perspective, long-term visions and a degree of leadership – are essential to change efforts. The actions and perspectives of management may therefore provide insights into success factors for the unusually high adoption of IT in the cases studied.



The Chief Executive of Kantô Medical Center is an experienced neurosurgeon and as such has no doubt had a great impact on the extension of streamlined logistics from mere warehousing to the workflow of the operating theatre. However, being owned by a supplier of IT (NTT Data Corporation), one can assume that a vested interest in establishing the hospital as a technological tour the force is every bit as potent a driver as managerial vision.

Kameda Medical center has been operated by the same family for eleven generations which has created a strong commitment as well as a unique long-term perspective in their management. Commitment to IT is no exception as their investments in this field pre-dates all commercially available HIS systems. It is thus fairly clear that management was the driver for introducing such an ambitious application of IT. Given the scale of the undertaking, it is no surprise that management had to make sure that it was actually used. This was managed by an inclusive approach where medical professionals were frequently asked for input during the development and implementation of the HIS. Once the system was in place, the option to revert to the old system (i.e. paper journals) was removed giving the doctors and nurses no real option but adopting the new order of things.

While having the financial or technical muscle of neither Kantô Medical Center nor Kameda Medical Center, Tôkatsu Clinic have managed to develop their own IT infrastructure – including EMR – over the past several years. Although initially motivated by the lack of commercial availability for required IT support, the driving force has always been upper management who has actively been promoting IT in the hospital for many years. While Tôkatsu Clinic also followed a gradual adoption, allowing time for feedback and resolving any issues, the approach for soliciting adoption and involvement was less coercive here compared to Kameda Medical Center. Rather than outright removing the old paper-based system, the Director himself adopted the system himself while asserting that any aspects of the system can and will be changed if it doesn't measure up.

Wakashio Network was pioneered by several medical professionals, one of which is the Director of Tôgane hospital on which the network is centered. The success is however not incumbent solely on the management of Tôgane hospital alone, but the management of all voluntarily participating clinics as well. However, being a highly decentralized effort, it should be pointed out that commitment to the issue (diabetes) is in all likelihood more important than managerial commitment to IT in explaining the success of Wakashio Network.

As we can see, case studies suggest that management has a strong (but not exclusive) influence on the presence of HIS and/or EMR. Again, this goes against the preliminary study which suggests that management is not generally interested in IT, readily handing the responsibility over to external suppliers.

With the significance of management in bringing about a change established, the next step is involvement of the end user – in this case the medical professional. Empirical data indicates that the level of interest in IT among medical staff is generally low – inside and outside Japan. Concurrently, input from end users is essential as it is otherwise impossible to understand the needs and requirements of any given group of stakeholders.

In the case of Tôgane Hospital and Wakashio Network, the effort was never framed in terms of IT, but rather as a method to deal with the challenges facing regional healthcare in dealing with diabetes. The need to tackle this issue was in no way controversial as statistics painted a rather grim picture. There was therefore a wide participation in the discussions (held at seminars etc.) regarding the function of the network and the requirements it must fulfill.

The fact that Wakashio Network is housed in one server situated in Tôgane Hospital with little or no (monetary) investment needed from clinics is also a contributing factor in soliciting participation. As it is only intended to deal with one issue, the system can be kept simple and the intrusion into the participating clinic's affairs is minimal.

At Kantô Medical Center, medical staff with an interest in computers and software join IT teams which periodically review the HIS. Although somewhat far-fetched, this extracurricular commitment to IT may be construed as a commitment to a cause of sorts. Regardless of framing, these individuals essentially act as representatives of the medical staff when proposing changes or rendering comments regarding the HIS. This would seem fortuitous as a will to communicate across professional borders indicates an absence of normative issues inhibiting dialogue. Also, one can assume that an interest in IT is either preceded or followed by increased technical knowledge in this field. This, in turn, would facilitate the dialogue in that the gap in expertise is more easily overcome.

However, empirical data indicates that the suggestions presented by these groups tend to be limited to their own working environment and not applicable to the organization as a whole. In other words, their professional identity still manages to shine through in that their scope is limited to their own occupation.

Kameda Medical Center also use groups of doctors (referred to as committees) to solicit suggestions regarding the HIS at regular intervals. The difference here is that the committees are not just made up of interested doctors, but rather all doctors are encouraged to take part. The position of management is that all medical issues (including those that involve the IT support) are to be driven by the medical staff. Comments from doctors at the hospital appear to support this. It is unclear whether issues regarding limited scope of suggestions are present at Kameda Medical Center as well, but theory suggests chances for a richer understanding increase as more stakeholders contribute their views. There is certainly no possibility of a comprehensive understanding if you do not have all the pieces of the puzzle.

In stark contrast, regular meetings are not part of the procedure at Tôkatsu Clinic. Suggestions and comments are instead submitted by staff to the head of each department who pass them along to the Medical Systems Department. Suggestions are then compiled, aggregated and prioritized according to urgency and feasibility. Truly urgent matters are of course dealt with in more direct manner – usually by picking up the phone.

This would suggest that matters regarding the HIS are treated in much the same way as other hospital business – that is to say it follows the hierarchy that is already established.

## **Implications of professionalism**

As previously mentioned, theory suggests two dimensions of professionalism. One is technical and concerns the limitations of expertise and occupational experience. It is usually too much to ask that two individuals working in completely different fields can hold a conversation about their respective jobs without an explanation being needed at some point.

The other dimension is normative and involves professional identity and culture. This is both harder to describe and to predict as it is essentially ruled by emotions and norms.

In case studies we have seen different manners of interaction between technical staff and medical staff. One end of the spectrum is illustrated by Kantô Medical Center where medical professionals join IT teams if they are interested in contributing to the HIS. While this ensures their volition and to some

degree their ability to interact with technical staff, it also carries with it the potential for misrepresentation as those not joining these teams are far less likely to sound off on issues relating to IT. Concerns not acutely felt by the members of IT teams may therefore linger.

Another consequence of relying on voluntary teams is that this essentially forms a new structure for communicating, evaluating and improving the HIS which is separate from the hospital's organization. Kameda Medical Center forms an intermediate step away from this compartmentalization of IT as the committees there have a somewhat wider spectrum of members. While still forming a separate structure, the expanded range of stakeholders can be expected to offer a more nuanced image of what issues are important to medical staff.

Tôkatsu Clinic goes a step further in that issues relating to its HIS are fact handled through the same channels as medical issues. There are no special forums or (regular) meetings just for matters relating to IT.

While appearing unremarkable, maintaining familiar patterns, as opposed to tacking on a new organization (or instituting an Internet-style free for all hyperarchy<sup>74</sup>) for dealing with IT issues, may be favorable in minimizing normative issues. Theory tells us that normative issues often relate to matters of professional pride and identity. Both of these may be adversely affected if the professional is undermined by those that should be beneath him/her in the established hierarchy. In a healthcare context, empirical findings from interviews as well as case studies indicate that there is a significant generational gap in the medical professional's ability to accept and utilize computers and information systems. This may well cause friction if skilled, experienced doctors find themselves circumvented by junior colleagues (or even nurses) in matters relating to IT.

Thus, making IT issues just another part of a hospital's affair has its advantages – assuming that one is able to motivate the professional to take an interest. The aforementioned IT teams at Kantô Medical Center is an example of this. The concern there is the insufficient scope of the professionals as they tend to limit themselves to their own working environment.

However, interviews as well as case studies show that the professional can apply the same drive on a grander scale as well. Japanese Association for Medical Informatics (JAMI) is a clear example of this as they are mostly made up of medical doctors who have taken a strong interest in advancing the use of IT in healthcare. Working national scale, one of their more tangible efforts is instituting the Healthcare Information Technologist certification which is intended to bridge the gap between medicine and IT. The exam is the result of many hours of effort by medical professionals whose work for JAMI is almost exclusively pro bono. Furthermore, the Healthcare Information Technologist certification is more or less the only one of its kind in the world.

But one does not have to expand the scope to national level to find examples of successfully aligning professional interest with use of IT. Wakashio Network is essentially built around the commitment of doctors in the region around Tôgane Hospital to improve care for diabetic patients. The focus of the effort was placed on a single medical issue – diabetes. But while the professional scope might be limited, the geographical area was considerably wider. This in turn necessitated Wakashio Network as a means to coordinate the effort. In a sense, it can be described as a favorable alternative to the masses of paperwork that would have been required as most participants do not work in Tôgane Hospital, but run their own private clinics. According to the Director of the hospital, the commitment to improving regional care for diabetes was even enough to bridge the generational gap. With a little patience, “even the older doctors were positive.”

Taking JAMI and Wakashio Network into consideration, one can therefore make the case that professionalism can be a driver for IT – if the scope is raised beyond the individual professional.

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<sup>74</sup> Evans & Wurster, 1997

## Conclusion

Theory suggests that professionalism in general is a source of conflict or rivalry. This study of the effect of professionalism on IT in Japanese healthcare does however paint a somewhat more nuanced picture. There are several factors inhibiting the diffusion of advanced IT support in Japanese healthcare, but professionalism does not seem to be a cause for concern. The study does however show that professionalism can be either detrimental or beneficial.

Professionalism may have a **detrimental** effect if the professional is unable to lift his/her scope beyond an individualistic working environment where the own professional interests are the only motivational forces. IT is a secondary technology which main function is to coordinate several distinct functions rather than serve the one “single artist” professional. Experiences from case studies therefore show that management with a holistic perspective is necessary to curtail initiatives that merely serve to improve local conditions.

Professionalism may also have a **beneficial** effect if professionals cooperate and reach a consensus regarding what IT support is needed. Empirical data suggests that this may be true even if the professionals in question are still focused on a single issue. Any increase in the number of stakeholders is bound to add more pieces to the puzzle and provide a fuller view of any given situation. Experiences from case studies indicate that an undertaking based on professional consensus reduces the need for management since the increased number of stakeholders in itself brings about a wider scope than the single professional can provide.

## **Suggestions for further research**

Two distinct approaches to overseeing issues related to IT can be distinguished from empirical findings. The former, that appear more common, is to create a new forum or structure to deal with technical issues. Examples of this approach are regular meetings or designated groups of individuals who act as liaisons or representatives for the professional group – in this case medical staff.

The other approach is to treat matters relating to IT as any other part of the working environment and deal with it through the usual organizational channels. In this case, department heads collect and pass along comments regarding IT as he/she would with any other issue.

While maintaining the established hierarchy may be beneficial in avoiding normative issues put forth by literature, the empirical evidence in this study is insufficient to draw any conclusions. Further research on the impact of professionalism in treating IT through normal channels as opposed to funnelling it through a separate organizational structure is needed.

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## Appendix A: Interviews

### Interview, Shigekoto Kaihara, 2010-02-04

- Diffusion rate of Computerized Physician Order Entry (CPOE) practically 100 %. Electronic Medical Records (EMR) considerably less frequent.
- Initial resistance to CPOE when it was first introduced decades ago gradually turned to acceptance (or at least tolerance) as the benefits become clear.
- IT in healthcare originally motivated by accounting. Complicated and time-consuming reports are compiled and presented on a monthly basis. Interest in using IT to improve healthcare itself is a more recent phenomenon.
- Today less than 10 healthcare facilities in Japan utilize IT in actual patient care. E.g. in administering drugs.
- Dr. Kaihara expressed a desire for healthcare providers to be financially rewarded for utilizing IT in patient care, e.g. as a fail-safe mechanism. Currently, the motives for introducing new technology into Japanese healthcare are insufficient.
- Doctors have no supporting staff to handle documentation and data processing. They have to perform these tasks themselves. While time consuming, it does help keep the number of staff low.
- Measuring quantity of care is easy, but how does one measure QUALITY of care?
- Lack of standardization in medical IT leads to information (such a patient data) usually being transferred by means of paper documents.
- Evidence-Based Medicine impossible to carry out on a national level as hospitals usually feature incompatible information systems and data structures. Regional projects to this end are however underway in Shizuoka prefecture where several hospitals fortuitously enough have compatible systems
- On the other hand, the information sent to insurance-companies for reimbursement purposes can be compiled on a national level as this information is arranged in a standardized format. The information featured in this national compilation is of course anonymous.
- It used to be that universities developed the software used in hospitals. Today software is usually purchased by software vendors who sell software packages.
- There are standards for IT applicable in a healthcare environment (such as the ones developed by GS1) but these are rarely used in Japanese hospitals.
- Dr. Kaihara feels that the development of IT in healthcare is inhibited by Ministry of Health, Labor & Welfare as they are disinclined to adopt use of new technologies.
- Strategy document such as e-Japan and u-Japan are issued by the Cabinet of the Prime Minister, but the economic power needed to realize these strategies lie with the various ministries under bureaucratic control. The new government (as of November 2009) is trying to shift power from bureaucrats to politicians.
- Legislation regarding use of medical procedures and drugs is clear and unambiguous. There are however few regulations regarding the use of IT in healthcare. It is considered one tool of many available to medical practitioners.
- Approximately 10% of Japanese hospitals have their own IT department and a handful has an appointed CIO.

- Purchases and additions to existing information systems is based on recommendations by appointed committees. The committees are usually made up of the intended end-users.
- In those cases where a hospital does not have its own IT department, there are usually a number of staff members (doctors, nurses, etc.) with a purely unofficial responsibility for maintaining this skill set. Hospital management then consults these individuals when the need arises.
- Approximately half of the medical facilities are privately owned and operated. The remaining half is made up of public facilities.
- There is a strong sentiment among the Japanese public that medical care should be egalitarian.
- Under the Japanese medical insurance system, individuals seeking care pay 30% (in addition to a monthly fee) of their medical expenses. The remaining 70% is covered by insurance.

### Interview, 2010-02-08, Sadahiko Kanô, Waseda

- Generally, healthcare in Japan is oriented towards the supply-side. The introduction of IT is shifting focus towards a patient-oriented perspective, but at a slow pace.
- A lack of cross-departmental cooperation in the medical research community. According to Dr. Kanô possibly because scrutiny by peers is undesirable.
- Medical informatics is attracting a younger generation of scholars and researchers. The field is in itself not recognized as an “authorized medical discipline.” It is however strongly patient-oriented.
- Another recent development in patient-oriented healthcare, “Two Hospital Case Studies of Advanced Deployments of Information Technology: Indiana Heart Hospital in Indianapolis, Indiana USA and Kameda hospital in Chiba, Japan” by Stephen Zurcher.
- Japan, Korea and the US all see low penetration of electronic journals. Success-stories in the US include the outsourcing of transcription of verbal recordings to India. This means that the work gets done over night and is available by the next working day.
- Age is perceived as an influential factor in an individual’s use and attitude towards IT.
- Dr. Kanô agrees that hospitals in Japan are lean in terms of number of employees. But this is in no small part due to the high levels of education required to work in the healthcare industry. Even clerical positions require specialized training. “You can’t just grab any OL (Office Lady) off the street.”
- If – as is often the case in Japan – a single doctor working in a private clinic handles a patient, the need for efficient documentation decreases.
- Stephen Zurcher’s research suggests that the high levels of investments required in order to introduce IT into healthcare forms a potent barrier. IT does not – in itself – bring any revenue to the caregiver. Qualitative improvements are difficult to argue (and prove). Even more so if there is no clear image of the current quality of care.  
However, in the US there is a way to argue for certain technical investments as improved documentation can be used in litigations.
- Information systems in Japanese healthcare dominated by Fujitsu, NEC, Hitachi, NTT Data, IBM Japan and Toshiba. None of these companies at present offer solutions that are interoperable. This has two major impacts. First, once a provider is selected moving to another supplier is practically impossible. Second, although intra-hospital communication

may run smoothly, inter-hospital communication may be impossible by any means other than a laborious transfer based on paper documents.

- Open EHR – attempt at breaking the lock-in effects derived by selecting a single provider of IS/IT. (<http://www.openehr.org>)
- Open EHR was initiated by medical doctors, one of which being Sam Heard, who realized that proprietary medical systems are a problem both in terms of cost but also lag in development time.

Medical systems should be developed in cooperation with medical professionals, not by IT-professionals working alone.

- One of the core components of open EHR is semantic interoperability which provides archetypes based upon which systems can be build with a shared nomenclature and frame of reference.
- Open EHR have been adopted by Microsoft in their development of medical software.
- Open EHR has the potential to reduce IT cost much the same way as Microsoft Office has reduced costs (and provided a *de facto* standard) for word processing.
- An MS-monopoly may not be the preferable solution, but it would be an improvement over today's lack of interoperability.
- Despite interest in the healthcare market from Microsoft, Japanese software providers appear too busy to take any action towards fending off this newcomer.
- Dr. Kanô feels that the effective use if information is the key to realizing Evidence-Based Medicine. He also believes that a unique ID given to every citizen would facilitate EMR efforts. (It seems that the new government is preparing to take steps towards this end.)
- The next big change in health care will not be robotics or any other showcase technology, but standardization.

### Interview, John Campbell & Naoki Ikegami, 2010-02-25

- Healthcare universally suffers from low standardization. Not only in terms of IT, but more fundamentally in terms of classification for care and diagnosis. For instance, what is to be considered *normal*? What are the causal relationships between different courses of action? It is difficult if not impossible to standardize IT support if medical professionals in different fields disagree on fundamental issues.
- Billing rules are standardized, but they are somewhat flexible (imprecise) in their application. They do for instance not take results of treatments into consideration, but merely record the number of occurrences the patient has been treated and for what ailment.
- Healthcare spending is generally low in Japan. Increases in expenditure are present, but controlled. Micro-management of fees is a big part of this. Japanese style “tweaking” of fees is more or less unique to Japan.

Fees are usually based on frequency of use. The fee of a very common test may increase in order to curtail frivolous use. It can thus be said that healthcare in Japan is partly focused on cutting cost. That being said, the Japanese system is not in itself a tool for cutting cost, but rather a way to encourage or discourage the use of certain procedures.

The downside of this system is that biannual table of fees is always a battleground for various interest groups. Not as intense as similar debates in the US, but since it is performed every two years it is quite draining.

- “Pay for performance” caused quite a stir when it appeared in the US and UK. It is, according to Dr. Ikegami, basically the same system as has been used in Japan for the past 50 years.
- IT in healthcare is a non-controversial issue insofar as everyone agrees there is a place for more IT in Japanese hospitals and clinics. A practical danger is that the micro-management paradigm may influence information systems as well. This may lead to a situation where the doctor “obeys the system” in order to insulate him/herself from the risk of legal action.
- The introduction of IT support in facilitating inter-hospital exchange of information seems to be a political issue rather than a technical one.
- Doctors not willing to adopt IT can be a “problem” as they do not face the penalty of reduced pay or benefits if they leave their current employer and take up a position at a different hospital. Resistance to IT is usually based on lack of IT proficiency or reluctance to accept the transparency that follows in the wake of computerized record-keeping.
- It has been suggested that the lengthy drug-approval process practiced in Japan is isolationistic in its design. Neither Dr. Campbell nor Dr. Ikegami agrees with this. It takes time, but only because clinical tests take time.
- E-billing is encouraged by the government by means of a minor rebate on every transaction conducted electronically. This rebate may be increased in order to further stimulate adoption. E-billing may then become mandatory once a sufficient number of healthcare providers have embraced the system. EMR is however “a long way off.”
- According to Dr. Campbell the Japanese are (in general) sensitive to foreign influences unless they can readily see the proverbial bottom line. Why should we adopt this practice? What’s in it for us? This attitude may delay adoption of IT in Japanese healthcare even as the US and EU invests heavily.

### **Interview, Michio Kimura, 2010-04-06**

- The complicated claim and reimbursement process was an early driver for the introduction of IT in Japanese healthcare. This has evolved into efficient order systems that are present in over 90% of hospitals.
- Japanese healthcare is generally considered efficient and inexpensive (cost efficient).
- Current penetration rate of EMR is approximately 20 %.
- Medical professionals are, in Dr. Kimura’s experience, unwilling to go 100% paperless due to convenience (paper easier to handle than terminals) and reliability (a system may go offline due to power outage or malicious software.) A hybrid system is therefore sought.
- Financial issues are the most important incentives and barriers to IT in Japanese healthcare.
- Investments are usually undertaken from a local (here & now) perspective. This is a contributing factor to lack of interoperability. Awareness in issues like interoperability is increasing at a slow pace.
- A clear incentive for introducing EMR is the ability to share data between departments in a hospital. I.e. radiology can access the same data as surgery – at the same time.
- Age is a factor in adoption of IT. Younger doctors/nurses are generally more IT literate. They are also more positive to paperless systems.

- The Japanese system allows for free access to hospitals. A patient may choose different healthcare providers (hospitals or clinics) for different ailments. A possible inhibitor for national EHR may be patient's objections to all hospital and clinics having access to their complete medical history. Information integrity and privacy is a big concern in Japan.
- Patients would, perhaps, be more open to their medical data being used for research purposes (such as evidence-based medicine) if they were assured that all data was anonymous.
- Japanese IT vendors specializing in the healthcare sector are generally unwilling to export their solutions or products. American and European companies are therefore increasing their market-shares in the Japanese market.
- Efforts underway from government and (interested) medical professionals to introduce "exit-clauses" into contracts with major providers of Hospital Information Systems. Local dealers are, however, reluctant to accept this as they stand to gain by either keeping customers through locking them in to their technical solutions, or charging data-conversion fees of millions of yen. (Extreme cases – 70 million yen)
- JAMI certification (Healthcare Information Technologist) is unique to Japan according to dr. Kimura.
- Transcribing information (paper-> electronic) takes time. Patients are displeased with the lack of "face-time" with doctors. I.e. doctors are looking at the screen, not the patients.

### **Interview, Gösta Malmer, 2010-04-12**

- Originally medical doctor. Has served county-level CIO as well as actively participated in local-level implementation of EMR systems. Has spent 6 years working with consolidating EMR systems in Västra Götaland County (in Sweden). Also has experience from working with legal and technical matters in a healthcare context on a national level.
- Primarily interested in IT from a management perspective. That is to say, the potential for increasing efficiency that is brought about by IT.
- Those countries where EMR efforts are recent developments have constructed centrally administrated systems that are, from a technical standpoint, easier to manage. Spain is an example of this. In the Swedish context, where there is already a plethora of information systems in place, consolidation is the only practical approach to adopt.
- Technical skills are not necessary to keep in-house, but maintaining know-how regarding healthcare procedures and environment is essential. IT can often be acquired as standard components.
- IT-projects labeled as failures are rarely due to technical problems, but rather insufficient or ineffective management.
- Swedish healthcare characterized by mixture of in-house development and acquisition of standard components. The latter makes up approximately 75% of IT-spending.
- Consolidation of information systems while necessary is not always popular. Decisions to standardize in public healthcare affects private operated clinics as well, essentially forcing them to adapt.
- Certain heterogeneity in information systems is advantageous as not all healthcare facilities are identical nor do they operate in an identical societal context. One must strike a balance between local adaption and standards.

- IT is a management issue – not a technical issue. Failure to make this distinction will lead to rapidly increasing costs as poorly integrated systems infest the IT infrastructure. Not limited to financial woes, a poorly managed mass of information systems also reduces patient safety as accessing essential data may be exceedingly laborious.
- Change management in healthcare is time-consuming as doctors are “solo artists”. Research and development of drugs and treatments yields status. Working with improving IT support does not. In later years, increased influence from social groups and politicians has made change efforts in healthcare less dependent on the “blessing” of doctors in effecting changes.
- In Dr. Malmer’s opinion, the inclusion of a “tech-geek” in change efforts is disadvantageous as this individual will probably end up spending more time focusing on irrelevant technical issues rather than overall benefits and goals. Furthermore, local initiatives (as those championed by tech-geeks often are, tend to have a local perspective with limited use to the organization as a whole.
- Efforts are currently underway to introduce common standards for transfer of prescription and medical data between countries in the European Union.
- In Sweden, vendors of Hospital Information systems form an oligopoly. The presence of several (albeit few) vendors is positive as competition drives innovation.
- Swedish Counties using the same HIS have formed customer groups in order to present a united front in dealing with vendors. This yields a greater chance to lobby for changes that the vendor would otherwise not accommodate due to the limited size of the Swedish market.
- Suppliers of HIS to some degree wish to integrate their products which – left unchecked – leads to a lock-in situation. Counties, on the other hand, have an interest in purchasing modular systems where individual parts can be substituted or added as needed.
- The mobility of patients – domestically as well as internationally – is a clear incentive for interoperable information systems in healthcare.
- Medical professionals (i.e. doctors and nurses) show limited interest in participating in development projects in relation to HIS. This, in turn, leads to systems which are poorly rooted in the organization and subsequent displeasure upon implementation. Development efforts must be conducted with the participation of individuals who possess knowledge and experience relating to the processes present in healthcare.
- Key factors according to Dr. Malmer:
  - Long term planning** – 5 years or more.
  - Political support** – preferably in the form of ratified decisions on a national or regional level.
  - Credibility** – deliver clear benefits to the organization. In doing this one must evaluate what is possible and what is reasonable. A practical approach would be establishing a limited – yet beneficial – groundwork and then adding functionality over time.

### Interview, Mihoko Okada, 2010-04-23

- Japanese Association for Medical Informatics (JAMI) does not only carry out certification on Healthcare Information Technologist, but holds lectures and seminars as well. They also publish textbooks on three topics in relation to the certification: IT, healthcare and healthcare information systems. Books are typically written from a holistic perspective (with an organizational focus) as those taking the test are assumed to be skilled in their respective field (Medicine or IT). Rather than

convey more expert knowledge the books provide a general perspective on organizational interaction and causal dependencies.

- All lectures, books and the tests are prepared by a committee which is headed by professor Okada. The committee is supported by over 100 members of JAMI spread over 10 universities working mostly on a volunteer basis.
- Certification exams are given annually in August.
- The Healthcare Information Technologist concept and subsequent certification was gradually initiated by JAMI themselves without government backing. As of 2010 they still do not receive any government backing nor do the members receive any significant (monetary) compensation for their work. As a contrast, there are government-sponsored programs for educating health informatics staff in the US.
- A 2001 survey conducted by JAMI revealed that hospitals in Japan usually do not assign staff to handle or supervise their information systems. Expertise and know-how existed in the organizations purely on an informal basis. This situation was one trigger for creating the Healthcare Information Technologist certification. Another was the lack of ability to communicate on a professional basis between IT professional and medical professionals.
- In professor Okada's opinion, the contents of the tests are aimed mostly at medical professionals who need to increase their technical know-how. Even so, the makeup of current candidates is approximately 60% industry (engineers/IT) and 40% medical staff. The industrial participants are usually already employed by IT vendors and see the practical (business) benefits in learning the medical terminology.
- The tests costs about 50 000 yen. Usually, approximately 30% of examinees pass the test.
- Several universities offer courses on medical/health informatics. There is however no consensus or standards on the contents on these courses.
- Professor Okada feels that the Healthcare Information Technologist certification bears some resemblance to the Healthcare Information Management certification offered by the American Health Information Managers Association, but feels that the latter is more geared towards administration whereas Healthcare Information Technologist is rather technical. There are technical certifications in the US as well, but mostly aimed at project leaders and managers.
- Currently, there are several formats competing for "domination" of interoperable hospital information systems. Two of the bigger being ICD 10 and HL7.
- The Healthcare Information Technologist test is multiple choice and "fill in the blanks." In case the individual is taking the exam for the more demanding *Senior* Healthcare Information Technologist, essay and interview-portions are added. Anyone can take the normal Healthcare Information Technologist examination, but to apply for the Senior Healthcare Information Technologist examination you need to be Healthcare Information Technologist certified and several years of practical experience.  
Also, conflict resolution is a part of the certification. Healthcare Information Technologist certified staff must be able to deal with the "angry orphans" whose wants or needs are not met by the Hospital Information System.
- Certification has to be renewed every 5 years. This is done by a point system where the individual accrues points by attending seminars and conferences. If he/she does not accumulate the required amount of points in 5 years, he/she will have to be recertified.

- The first certifications were carried out in 2003. Professor Okada has been a part of the certification process since year one.
- There is no analysis or study of the effect that Healthcare Information Technologist certification has on an individual's performance or benefits for the organization to which he/she belongs. A general lack of information with regards to the state of affairs before the fact is a main problem in conducting any evaluation.
- In 2009, the Japan Council for Quality Health Care added Hospital Information System as a metric in its evaluation of Japanese hospitals.
- JAMI is dominated by healthcare professionals, but a shared interest in medical informatics unites the members.
- JAMI sees Healthcare Information Technologist as existing in the "grey" area between research and practice.
- There are currently about 8000 certified Healthcare Information Technologists in Japan.
- Historically, there is a big gap between healthcare and welfare in Japan. Certain universities, like Kawasaki University of medical welfare to which Professor Okada belongs, strive to close the gap.



## Appendix B: Case studies

### Kantô Medical Center NTT East Corporation, 2010-02-26

- Director of Kantô Medical Center, Dr. Chikayuki Ochiai, has previously held a number of positions including professor of neurosurgery at University of Tokyo hospital and head of neurosurgery at JR Tokyo general hospital.
- IT is present in several ways in healthcare at Kantô Medical Center NTT EC, for instance Electronic Medical Records, barcodes, and RFID tags. Recently they also adopted digital MRI scans which can be transferred electronically. Some of these systems are integrated; some (like the MRI scans) are not.  
Generally the IS/IT support in Kantô Medical Center is extensive with EMR accessible from 900 desktop terminals.
- PDAs utilized in drug administration to avoid mistakes or adverse effects.
- Dr. Ochiai feels that lack of standardization in medical IT is a problem. The lack of social security numbers in Japan adds another barrier to instituting nationwide records.
- Upon hospitalization in Japan, the average stay is approximately 17 days according to Dr. Ochiai. In Kantô Medical Center the average stay is 10.7 days.
- With the introduction and diffusion of IT at Kantô Medical Center, productivity in terms of *inhouse* patients treated increased from 9732 to 13395 between 2001 and 2004. The number of staff did not differ substantially during this period.
- IT usage can be considered a generational issue. Younger staff members are typically accustomed to typing and inputting data by means of computer or terminal.  
Past cases of mistreatment (due to incorrect administration of drugs etc.) form a powerful incentive for healthcare personnel regardless of age.
- As Nippon Telegraph and Telephone Corporation (NTT) own Kantô Medical Center, they are (of course) the main supplier of computer hardware and software.
- EMR carries with it an initial cost, but costs do not increase noticeably beyond the initial threshold since the systems specifications are basically the same regardless of workload.
- EMR at Kantô Medical Center based on North American Nursing Diagnosis Association (NANDA) definitions.
- No data is available regarding the frequency of mistakes before/after the introduction of EMR.
- Effective information systems can be used to match patient data with known risk-factors/risk-groups for various diseases. Dr. Ochiai sees this practice increasing over the next 5 years. (From hospital-level to regional or national level. This will of course require a dependable way to render patient data anonymous.)
- At Kantô Medical Center, small "IT teams" take charge of improvements in information systems. These teams typically consist of doctors and/or nurses who are computer "otakus." (IT-literate). Beyond these teams, the staff is however largely indifferent and use what they are given.  
One problem with relying on computer "otakus" is that they tend to suggest improvements in their own field. They have to be "kept in line" by management.
- Despite the fact that NTT owns and operates several hospitals, there is no interoperability between Kantô Medical Center and other NTT hospitals.

- Dr. Ochiai feels that medical data should be kept by the patient themselves by means of IC-card or some similar solution.
- Dr. Ochiai agrees that back-office staff in Japanese hospitals is small and that keeping costs as low as possible is a priority.
- 75% of patients at Kantô Medical Center are from the Tokyo area. Shinagawa-ward (where the hospital is located) ranks 3<sup>rd</sup> in Tokyo by number of patients.
- Not all data is recorded (into EMR) automatically. Some has to be entered manually.
- Utilization of IT is not featured in any medical school in Japan.
- The supply-chain of medical equipment and drugs work well up until the hospital gates. The hospital however uses a different system which requires manual conversion. There is some waste since safety is (of course) a high priority.
- IT investments have improved logistics in that the same job can be done with a smaller local stock.
- There is approximately 20 in-house IT staff. They also serve 5 other hospitals remotely. Despite this Kantô Medical Center cannot exchange patient data with other hospitals served by the same IT-staff.
- System improvements average one upgrade per month.
- Dr. Ochiai feels that Kantô Medical Center is in many ways a showcase for the expertise of NTT.
- A few suppliers are given use of facilities in the hospital (basement) in order to improve logistics.
- Although RFID is more advanced, there is no perceived need to introduce it everywhere. Barcodes are in many cases sufficient.
- Dr. Ochiai does not believe that NTT are presently able to export their systems beyond Japan. Nor are they interested in doing so.
- IT-groups review the Hospital Information System 3-4 times per year. Staffs are free to submit comments and suggestion regarding the information system to the IT-groups if and when they find something that is not satisfactory or could be improved.

## **Kameda Medical Center**

### **Toshitada Kameda, 2010-04-09**

- Kameda hospital group is associated with among others Apios Co. Ltd.
- Kameda hospital boasts 100% paperless EMR system.
- The Hospital Information System at Kameda Medical Center goes beyond EMR. It also includes more entertainment-oriented features intended to enrich the patient's stay. An example of this is the bedside multimedia interface which features movies, TV, room service and access to the patient's own medical records.
- Kameda hospital adopts a holistic perspective which it refers to as the "continuum of care." This includes affiliated satellite clinics, rehabilitation, gymnasium (for preventative care) etc.
- Outpatient care integrated with hospital IS. Together they form an integrated healthcare network. From a technical standpoint, the integration is not 100 % but it does offer some degree of interoperability with partner facilities.
- Timeline:
  - 1970 – billing system
  - 1980 – departmental systems integrated with billing system

1990 – order entry system

2000 – integrated medical information system (paperless). Priority #1: Disclosing and sharing medical information between departments

- Prior to introduction of EMR – staff skeptical or even negative to IT in everyday care. There was a problem in visualizing (understanding) benefits. Positive reactions after implementation when merits were clearly visible.
- Current HIS offers data-sharing in real-time.
- Latest endeavor at Kameda Medical Center: The PLANET-system which offers web-access to the patient's own medical data from any location on the planet. It is based on XML, DICOM and HL7 formats. Data can also be accessed using mobile telephones using current FOMA technology.
- Recent trend in healthcare: Movement away from provider orientation to patient orientation and patient participation.
- Navigation care map (in EMR) features patient timeline with past & future events. This provides overview (context) of a patient's situation.
- With regards to HIS: Standardization of data & data warehousing are high priorities. Both are needed in order to interconnect and utilize data on a national level.
- Recent activity: Benchmarking with other healthcare facilities. This would not be possible (on a large scale) without computerized information systems.
- Dr. Kameda feels that there's a lack of an overall strategy regarding healthcare in Japan.
- First HIS at Kameda hospital developed 1990-1995.  
Lack of experience was a problem since everything was (even conceptually) new. Several choices made in development became de facto standards for HIS in Japan. Non-technical barriers (such as culture, preconceptions) were more difficult to overcome than technical ones. Strong leadership was required.  
IBM adopted as partner as they presented *the lowest bid*. The system eventually implemented was however not what originally pitched by IBM, but rather something Kameda and IBM built together.
- Large bureaucracy associated with Japanese billing system. Major reform may involve loss of employment opportunities (as computerized systems require fewer administrators) which may be a significant inhibitor to reform.

### Akio Arai, 2010-04-26

- The first version of Kameda Medical Center's Hospital Information System was launched in 1995. Developed in cooperation with IBM.  
The second version was launched in 1999. This was produced in-house by the Kameda group. 2010 will see the release of a third version.
- Mr. Arai has been with Kameda since 1980.
- Available information is determined by the access rights of the user. Thus, everyone can use the same system despite different aims and professional roles.
- The current storage capacity is 50 TB with 20 TB currently used.
- Interface highly customizable by the doctor him/herself based on personal preference, patient, type of procedure etc. It usually takes 1-2 hours to train a physician unfamiliar with the system how to use it.

- In Mr. Arai's experience, technical factors not the big problem with regards to introducing Hospital Information Systems. Legal issues and the will (or rather lack thereof) to cooperate both represent much greater barriers.
- A few employees at Kameda have the Healthcare Information Technologist certification. It makes little difference for someone who works at Kameda, but it may be a factor when applying for a position there. On the job training is more important.
- The IT staff has monthly meetings with doctors as represented by the heads of the hospital's IT committees.
- The IT staff has grown from 10 in 1995 to 50 in 2010.

### John Wochoer, 2010-04-26

- In the early years medical IT was accompanied with high costs and poor support.
- Between 1995 and 2001 Kameda Medical Center operated parallel electronic and paper systems for legal reasons. Birth certificates and death certificates still require paper documentation.
- Mr. Wochoer has been working with the Kameda Medical Center in some capacity for a couple of decades.
- During the first 10 years of utilizing HIS, Kameda Medical Center spent upwards of \$30 million on IT. This was viewed as an investment in the hospital. Commercialization (co-development of HIS with Siemens for retail purposes) came later as a spin-off effect.
- Introduction of IT required some degree of workflow redirection in that all data is supposed to be entered at the point of care. Secondary data (i.e. data entered at a later time or by someone else) is less reliable as omissions occur.
- Ways of introducing IT into healthcare according to Mr. Wochoer: 1. "Tell them, don't ask them." 2. "Don't offer any other options."
- The two main issues that Kameda Medical Center has faced: 1. Radical change is not the usual way to go about things in Japan. 2. Some (mostly older) doctors not used to working with computers. This was solved by offering tutoring. The first two years with HIS were a challenge for doctors not experienced in using computers. They were spurred on by seeing the progress made by their younger colleagues.
- Generally, no doctors left or transferred somewhere else due to the introduction of IT. Mr. Wochoer could not remember any leaving staff member stating that as a principal reason though he mentioned that some physicians might have used it as a so called "add-on" reason. In general, Kameda Medical Center does not have the big turnover that most hospitals have. Heads of department have usually stayed in the organization for 10-20 years or more.
- Doctors are motivated by access to data. IBM was selected as a partner for developing the first version of Kameda Medical Center's new information system because they were the best at data management at the time.
- All committees at Kameda Medical Clinic chaired by doctors, not technical staff or administrative staff. Committees are typically organized by department.
- Medical professionals make all decisions regarding clinical matters. Generally, medical staff also drives improvements to information systems and IT support. Administrative staff only interferes when suggestions are very impractical or very expensive. Technical staff only raises objections when there are major technical barriers to what is being suggested. "Which is as it should be as the IT staff works for the clinic" says Mr. Wochoer.

- IS not used to evaluate a doctor's performance in a negative way. Mr. Wocher emphasized the importance of this perspective. Doctors did fear this during the early years and it was necessary to dispel their angst.  
Management does however use the information system as a "dashboard" for information on how the facilities are operating. "Every management wants this."
- The clinic (which is currently the main building of the Kameda Medical Center) was constructed 1993 – 1995. Part of the design phase was what they called ace, king and queen: Ace – real buildings, real property; King – manpower; Queen – software, hardware, and support for IT. IT was thus literally built into the walls and was a big deal from day one of construction.
- During the development and integration process, meetings were held regularly approximately every month to deal with possible interest problems and the like. The attitude to implementation was that change needed to be driven by the MD, not the IT.
- Introducing IT support for outpatients was given a higher priority as it is easier to implement and administrate. With inpatients the variables are too many and change too fast to enable the gradual introduction required in the transfer from paper to a computerized system.
- PLANET – a patient oriented system which Mr. Wocher compares to Internet banking. Implemented in 2001, it allows patients to access their medical data from anywhere and share it with other hospitals. The keys to accomplishing this is making it voluntary and placing patients in charge. Being able to access one's medical data anywhere in the world seems like the natural step following EMR, says Mr. Wocher.  
PLANET currently has about 3000 users.
- Transparency is a priority at Kameda Medical Center. For instance, anyone can access any doctor's CV from the hospital bed or a terminal in the waiting room.
- Mr. Wocher tries to interact with doctors in their daily work whenever possible. It is important to show that you are not sitting in an "ivory tower." A consequence of transparency is the removal of barriers.
- As Kameda Medical Center is virtually paperless, IT staffs are – like doctors – on call.
- Kameda Medical Center is popular with interns as indicated by the 6 to 1 ratio between applicants and available positions.
- Patients are encouraged to leave feedback upon their discharge. Mr. Wocher strives to do a follow-up after 6 months as well.
- Mr. Wocher defines EMR as "everything that the hospital can provide."

### Questionnaire, Kameda Medical Center, 2010-04-27

How would you describe the handling of information and patient data in your daily work? Do you find the information system suited to your needs?

**Respondent 1:** Mostly yes.

**Respondent 2:** Thanks to the digital medical record system, it is quite comfortable and easy to obtain the data sets from the EMR (electronic medical record) and it seems that it works very well. (I generally find it suited to my needs), however in detail, it is sometimes difficult to produce the data for the clinical research or publication.

**Respondent 3:** Mostly suited to my need.

Have you had any direct interaction with the hospital's IT-staff? If so, did you feel that they understood your situation?

**Respondent 1:** Yes. They understood the situation.

**Respondent 2:** Yes, I had. Regarding the user interface or practical point of view, I felt that they understood well.

**Respondent 3:** Have not had direct interaction.

Do you feel that you have a sufficient amount of influence over the development of the information system at Kameda Medical Center?

**Respondent 1:** Yes.

**Respondent 2:** Certainly Yes.

**Respondent 3:** Yes.

Do you, in your current position, find it easy and rewarding to cooperate or consult with medical staff from other departments?

**Respondent 1:** Yes.

**Respondent 2:** Yes, I do. Majority of the staff in Kameda Medical Center are cooperative.

**Respondent 3:** Depends on the department, yes.

Kameda Medical Center relies heavily on its information system and is virtually paperless. Did the transition from paper to computer feel like an easy step for you or did it require a period of adaption?

**Respondent 1:** It did require some adaptation for me during the transition. I do not feel that the IT is drawing attention away from actual medical care.

**Respondent 2:** Well, at the beginning of that use I felt it looks like a kind of time consuming and complicated, but later (maybe a couple of weeks) I adapted. Now I can't go back to the old paper type of system.

**Respondent 3:** Relatively easy transition.

Much has been written in various papers and magazines regarding the information system at Kameda Medical Center. Do you, as a doctor, feel that the technology is drawing attention away from actual medical care?

**Respondent 1:** (The respondent did not answer this question.)

**Respondent 2:** No, I don't. Those technology improved our daily clinical work and it facilitates the patient based medicine.

**Respondent 3:** Not sure.

If you feel comfortable sharing the information, please tell us how long you've been working at Kameda Medical Center and in which department you have spent the bulk of this time.

**Respondent 1:** About 14 years in the department of internal medicine.

**Respondent 2:** Department of Neurosurgery.

**Respondent 3:** Many years in surgery.

### **Tôkatsu Clinic, 2010-05-14**

- Specializes in dialytic treatment.
- Tôkatsu Clinic boasts an Electronic Medical System (EMR) designed and implemented in-house.
- Brief timeline:
  - 1995 – IT support for dialysis-efforts.
  - 1998-2000 – Order system and IT support for reception and booking appointments.
  - 2007 – Outpatient EMR and electronic record-keeping
  - 2008 – EMR phase 1 including inpatient EMR and EKG
  - 2009 – EMR phase 2 including nursing staff, imaging (MRI etc.)
  - 2010 – Full EMR
- EMR connected to various subsystems (such as EKG, imaging, staff intranet etc.) which are all obtained from different developers. It is in other words a modular system where parts can be replaced (or fail) without bringing the entire Hospital Information System (HIS) down. EMR software also running on separate server.
- Some systems are stand-alone, like ordering.
- Staff accesses the HIS from any one of the 300 terminals (most of which are laptop computers).
- IT-support for dialysis-efforts links Tôkatsu Clinic to smaller surrounding clinics (called satellite clinics). Through this system, staff at both hospital and clinics may see when and where a patient is being treated.
- The origin of self-development efforts can be found in 1995 when desired IT support for dialysis treatment was unavailable from any vendor. They therefore proceeded to design their own solution.
- In moving towards EMR (in 2007), Tôkatsu Clinic faced decision of buying off-the-shelf package or continuing in-house development. In-house continuation was elected as it enabled independence of system and database, use of subsystems and gradual implementation (as opposed to “big-bang” installation). All these things combine into a very modular HIS.
- Benefits of elected approach:
  - Ability to continue using present systems and databases (as subsystems)
  - Ability to combine best-of-breed subsystems
  - Implementation suited to hospital processes
- Demerits of elected approach:
  - Time-consuming (system itself plus documentation)
  - Only those few local staff developing the system know it well
  - Training maintenance staff also takes time
- Merits and demerits arrived at by IT staff based on experiences from daily work.
- Hospital IT staff consists of 5 people.

- Requests and comments from medical staff are divided into two types: Those that are dealt with immediately (serious problems or system bugs) and those that can wait (suggestions for improvements that are non-urgent).
- Certain conditions were applied to implementation and use of outpatient system. Using it must not lead to either patient visits taking too long or mistakes being made due to confusion or incorrect data.
- The same type of conditions for inpatient system were data entry should be made bedside using computer terminal and response time must be less than 5 seconds.
- Future goals for HIS at Tôkatsu Clinic: Improved security (extension of password system), going 100% paperless, improving response time and improving functionality.
- Reasons for devoting much interest to IT include the desire to standardize data exchange between hospital and clinics, and also to use data in research and statistical analysis.
- In 1995, using computers in the workplace was not a common occurrence. There was therefore some resistance to switching from pen to keyboard. "What's the use of switching?" What finally convinced them was the realization that data can be accessed anywhere by anyone in the hospital. Information does not "disappear" into a computer or a filing cabinet.
- EMR and subsystems rely on simple but effective use of text-files for data exchange. "A bit old-fashioned, but it works and every system can read and write text." They do not use HL7 or any similar standards.
- Response time kept low by dividing data into current and old. Older data is archived leaving more room on faster servers. The distinction between current and old is difficult at times.
- There are no formal scheduled meetings regarding IT-matters between IT staff and medical staff. Data regarding requests and concerns are collected locally (in the departments) and correlated/addressed centrally by the IT staff.
- Waiting rooms are equipped with TV screens who display schedules and appointments.
- 1<sup>st</sup> floor features wired LAN, the 2, 3, 4 has wireless.
- Tôkatsu Clinic features 95 beds and a total of 337 staff.
- HIS features different interfaces for inpatients and outpatients as the informational requirement differ between the two.
- Distribution of tasks (doctor to nurse) as well as confirmation of tasks carried out (nurse to doctor) both supported by HIS. This gives staff some amount of freedom to work independently.
- Hospital staff able to keep track of patients not only when they are treated in the hospital but also in the satellite clinics.
- Overview is a priority. The interface must display information regarding the patient in an easily accessible way. Important data must not be overlooked.
- The HIS is upgraded on a monthly basis giving staff time to adapt.
- New staff-members usually need about a month to grow accustomed to the HIS (according to a senior nurse).
- Some aspects of the HIS, such as interface, are the result of compromises between various user groups.
- HIS is used to coordinate the many team-efforts at Tôkatsu Clinic. Different teams may be given different interfaces depending on what information they require.
- According to a doctor at the hospital, any issues or problems that arise are usually solved by the IT staff within the hour.



- Doctors feel that handling recipes by means of computer is easier and safer as there is no chance of misinterpreting printed characters. It does however take a little getting used to.
- Two-way flow of information between clinics and hospital only in managing dialysis efforts. Currently, 1100 patients are covered by this system. Its shape and form was arrived at by broad consensus between hospital and participating clinics.
- The level and frequency of adaption seen at Tôkatsu Clinic would be very expensive if one were to rely on a vendor.
- When asked, a nurse (who has been with the hospital 3 months) felt that the HIS was easy to use. It is also practical as updates of patient data are instantly available everywhere inside the hospital.
- Upon taking up employment at the hospital, the first day you are given a couple of hours of training on how to use the HIS. This is enough as you can always call support if you have a problem.
- Tôkatsu Clinic had no budget drawn up for the shift to EMR. It was all done by staff already employed by the hospital. The only difference was that two of the IT staff members were moved full-time to EMR efforts.
- The only major purchase in the shift to EMR was a software for coordinating data which cost 5 000 000 yen.
- Much time was however given to finding an interface that was broadly accepted.
- Cost-cutting was never mentioned as a motivation for EMR efforts.
- Other hospitals have not showed any real interest in the EMR-efforts at Tôkatsu Clinic.
- Before designing the interface for the HIS, staff at Tôkatsu Clinic had a look at the systems sold by vendors.
- Ultimately, the director of the hospital is responsible for introducing IT at Tôkatsu Clinic. He has had a vision of IT in his hospital for a long time. He was also the first one to start using it on a regular basis. He realized that doctors might have problems understanding the benefits of EMR, so his basic message upon launching the system was “Just start using it. We can change it if you don’t like it.”

## **Tôgane Hospital (Wakashio Network), 2010-05-10**

### **NTT Data Corporation, Tomoyasu Tanaka, Kazunari Takahei and Takafumi Kimura**

- Feedback from users every two months plus at assorted conferences and seminars.
- Sponsored in part by Ministry of Economy, Trade and Industry (METI).
- Main server located at Tôgane hospital, other hospitals (not using NTT systems) may connect through interface in compliance with HL7 standard.
- Most clinics and pharmacies connected to Wakashio have no EMR system of their own. (Not needed to join, although participating pharmacies who wish to go paperless need a terminal for e-signatures.)
- Only one staff-member from NTT Data Corporation managing Wakashio on site. Others provide remote support as needed. More on-site staff wanted by NTT, but hospital unwilling or unable to accommodate the added expense. More pleasant working facilities at Tôgane also wanted by NTT staff.
- There are plans to introduce similar (but not identical) systems in other parts of Japan depending on regional needs and possibilities.

- Mr. Takahei, Mr. Tanaka and Mr. Kimura are all Healthcare Information Technologist certified and feel that it is important in facilitating communication between IT staff and medical staff.

### Chiba Prefectural hospital Tôgane, Aizan Hirai

- Patients with chronic diseases driving costs in Japanese healthcare. There are two reasons for this. First, the lack of gate-keeper system enables them to “swamp” popular hospitals. Second, under current regulations they pay nothing for treatment (such as dialysis) regardless of age.
- Better management of chronic diseases may decrease medical costs as the population ages (and statistically can be expected to develop more chronic conditions). Under current system, medical costs WILL increase.
- Number of doctors practicing in rural areas decreasing. Tôgane is no exception as they have gone from 24 to 18 in 5 years. Average age of doctors also increasing as few younger doctors choose rural areas to work.  
This can either be forcibly rectified by pushing younger doctors to rural areas, or one can make the most of what one has and cooperate with other actors. Wahashio network is an example of the latter.
- The purpose of Wakashio network is to create a sizeable virtual hospital that covers a large area. General care is then directed towards clinics and specialist (and emergency) care towards hospitals.
- First version of Wakashio launched in 2003. This version was not a true EMR system – this functionality was added later. Diabetes was the focus of Wakashio efforts due to its sharp increase in recent years (300 % over the past two decades), and acute lack of diabetes experts in the Chiba area.
- Dr. Hirai joined Tôgane hospital as director in 1998.
- Staged Diabetes Management (SDM) is essentially an intensive training manual for treatment of diabetes grounded in evidence-based medicine. Originally created in the US in late 1980’s.
- SDM study circle started 9 years ago at Tôgane hospital in an effort to deal with challenges of diabetes. Meetings are held frequently.
- IT supported SDM-efforts in that it facilitated transfer of knowledge and information (patient data).
- Doctors overall positive to introduction of IT-support for SDM-efforts. “Even older doctors were positive”. Little or no special training was needed. Rather, participating doctors learned whilst working with the system. “Training on the job” as Dr. Hirai put it. SDM-efforts were launched roughly around the same time as the Wakashio network. Hence, they effectively “grew” in sync.
- Currently, 36 clinics have joined the Wakashio network. In treating diabetes, estimates indicate that virtual hospital approach increase efficiency by 100 %.
- In 2006, Ministry of Health, Labour and Welfare designated several diseases and conditions to be given extra attention – diabetes being one of them. Increased cooperation between clinics and hospitals was also included in ministry strategies.
- Evaluation of complicated cases and stable cases conducted at hospitals. Complicated cases continually treated at hospitals whereas stable cases are directed to clinics where they can be treated in accordance with SDM. They return for a full check-up once a year or if their

condition deteriorates. This approach to care is resource-effective and the prerequisite coordination is made possible through the Wakashio network.

- 7 parameters used to determine if a patient is stable or not stable. These were arrived at through consensus between experts and general practitioners. These 7 parameters, and their respective tolerances, are implemented in Wakashio.
- All data is stored in servers located in Tôgane hospital.
- Currently over 3000 patients registered.
- Next challenge: Regional EMR without disturbing Japanese free access system. IT can facilitate this.