Cases on Adoption, Diffusion, and Evaluation of Global E-Governance Systems:

Impact at the Grass Roots

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Chapter 10
Conceiving Community Knowledge Records as E-Governance Concerns in Wired Healthcare Provision

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EXECUTIVE SUMMARY

This article investigates the potential of community knowledge records (CKRs) in the electronic transformation for healthcare provision in Macau. Of specific interest is the electronic governance (e-governance) context to examine the various information and communications technologies (ICTs) for personalized healthcare support, such as the electronic health (or e-health) records (EHR). From a governance perspective, the installation of ICT-based e-health support must begin with the healthcare concerns of citizens. The challenge is to identify the organizational context of e-health provision, lying in the realm of e-governance, and referring mainly to the decisions that define expectations, enable empowerment, and verify performance of the systems involved. The goal of this chapter is to explore the context of citizens' e-health provision, including the EHRs considered as the digital records of personal medical history, accumulated from cradle to death. Elaborated are the issues of privacy that must be rendered in proper perspective where e-governance is to install a trustworthy electronic system of healthcare administration. The discussion around the e-governance concerns of any attempt to install e-health services based on the legitimate use of personal EHRs, should provide a sense-making perspective to interpret the e-health challenge of the contemporary knowledge society.

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ORGANIZATION BACKGROUND

With the expanded possibilities created by the emergent digital economy (Miller, 2009; Tapscott, 1997), the topic of computing in public administration is gaining increasing attention in today's Macau (http://www.gov.mo/) which is visible from the series of electronic government (e-government) projects available at this URL site http://www.emacao.egov.iist.unu.edu/index.php/emacao/projects. Obviously, following the trend of many a wired government around the globe (O'Looney, 2002), Macau is actively incorporating computer applications into public sector strategies for improving the efficiency, effectiveness, responsiveness and accountability of her governance.

Indeed, the e-Macau initiative as a major e-government transformation undertaken by the Macau Government comes in different stages. The first phase called the e-Macau Project, which commenced in July 2004 and ended in June 2006, focused on survey and assessment of 44 governmental units to establish the state of e-government readiness in the government as a whole. It included extensive training of public officers in technical and, to a lesser extent, managerial aspects of e-government. Specifically, this first phase also aimed at providing to information technology (IT) officers, with the required experience and know-how on large-scale development of electronic public services through training and various prototyping projects on public services of related interest (Macau, 2008).

Outputs from the first phase of the project include a series of policy recommendations to guide the development of e-government in Macau, and consequently the design of the next phase of the e-Macau initiative. We are witnessing many a public officer's increasing involvement both in the details of administration of information and communication technologies (ICTs) and in the orchestration of technology policy development in the local government, better called the *Macau SAR (Special Administrative Region) Government*. For example, realizing the development of e-health records (Moller & Vosegaard, 2008; Garets & Davis, 2006) as an important constituent of the e-government's healthcare system, many an SAR official have already expressed the use of e-health records must be considered as one of the long-term e-governance concerns in Macau.

In fact, the case of e-health record has often been considered as a specific instance of community knowledge record (CKR) (Kahn & Sheshardri, 2008; Gropper, 2007; Hartnell-Young, 2006; Handzic, 2003), carrying important populace details for the governance body to make timely decisions to better serve the needs of her citizens, such as the provision of suitable healthcare for different age groups across different geographical regions.

In order for governments to evolve their planning for citizenry healthcare in a way conducive to the buildup of proper e-health records, organizational, managerial, and inter-organizational structures, supports, staffing, training, practices, cultures, boundaries and policies will need to be considered. It is a challenge in governance rooted in radical changes in available technologies as well as the potential transformations in management practices, ownership rights, and the distribution and arrangement of political power (Jepsen & Jepsen, 2008; Liu, 2007; Malkia & Savolainen, 2004; Lanvin, 2003). As public managers in Macau's healthcare sector conceive their wired involvement over the coming decade, they will need to keep in mind such a challenge, and think deeply about how their policy making can contribute to the development of more effective and efficient public health services for the almost half a million people living in the SAR.

SETTING THE STAGE

It has been recounted in the literature (Landsbergen & Wolken, 1998) that governments are often unaware of what they know because their systems

cannot talk with one another. This fits timely into the context of a wired government (O'Looney, 2002, p3) where connections are supposed to have been made among disparate pieces of information so as to form new insights and new levels of efficiency. The aim of the e-Macau project (http://www.emacao.egov.iist.unu.edu/index.php/emacao/program) is to raise the maturity of e-government in Macau through a well-planned framework of initiatives to further improve the application of IT by the Macau SAR Government and its constituent units, focusing on inter-unit, government-wide initiatives spanning technical, managerial, organizational and human aspects of technology use in the public sector.

This echoes with the fact that technology, like the wires in a computer, enables connections but does not ensure that they will be made. Only people and organizations can do that. In light of this, the use of the term "wired" by O'Looney (2002), more properly should refer to both the technical linkages that allow connections and to the features of the organization and environment that lead people to use the technology to actually make connections.

Accordingly, as governments become more wired, the people in and around government will know more and communicate what they know more effectively. Public managers, staff and ordinary citizens will then be able to use information and communication systems more effectively to know more and to know who to talk to about what. So far, the impact of Macau's e-government initiatives has continued to be felt by government units in terms of their increased technical capability in implementing e-government services and their understanding of the major organizational and management issues involved in e-government implementation.

According to a recent study conducted by the iCentre (http://icentre.manetic.org) of Manetic – Macau New Technologies Incubator Center (http://www.manetic.org) on Macau's overall e-government development status using the stages of e-government evolution model suggested in the United Nation's E-Government Survey 2008 (p.16):

- Stage I – Emerging: A government's online presence is mainly comprised of a Web page and/or an official Website; links to ministries or departments of education, health, social welfare, labor and finance may or may not exist. Much of the information is static and there is little interaction with citizens.
- Stage II – Enhanced: Governments provide more information on public policy and governance. They have created links to archived information that is easily accessible to citizens, as for instance, documents, forms, reports, laws and regulations, and newsletters.
- Stage III – Interactive: Governments deliver online services such as downloadable forms for tax payments and applications for license renewals. In addition, the beginnings of an interactive portal or Website with services to enhance the convenience of citizens are evident.
- Stage IV – Transactional: Governments begin to transform themselves by introducing two-way interactions between citizen and government. It includes options for paying taxes, applying for identity cards, birth certificates, passports and license renewals, as well as other similar government-to-citizen interactions, and allows the citizen to access these services online 24/7. All transactions are conducted online.
- Stage V – Connected: Governments transform themselves into a connected entity that responds to the needs of its citizens by developing an integrated back office infrastructure. This is the most sophisticated level of online e-government initiatives and is characterized by:

1. Horizontal connections (among government agencies)
2. Vertical connections (central and local government agencies)
3. Infrastructure connections (interoperability issues)
4. Connections between governments and citizens
5. Connections among stakeholders (government, private sector, academic institutions, NGOs and civil society)

It is found that the majority of Macau SAR Government units' Web presence is at Stage III – Interactive, which includes 47 governmental units and occupies about 72% in total (Ip, 2009). These units are from the category of Economy and Finance, Social Affairs and Culture, Transport and Public Works. There is no doubt that the SAR Government has been working hard to cope with the e-government challenges. Connected government is the trend of the world, and the finding shows Macau is still far from its destination. It is expected that there are many big challenges ahead in the electronic transformation of Macau's governance operations, including setting up frameworks, standards, guidelines and enhancing the infrastructure of various government departments. Yet, the greatest challenges foreseen in Macau's route to a connected government lie behind all the legacy systems used in many departments where process re-engineering in both the intra- and inter-governmental units are expected together with a change of mindsets and skills of the people involved.

Interestingly, as O'Looney (2002) points out, becoming wired requires a focus on organizational innovation – not just computer gadgetry; instead, in the process of becoming wired, governments will often change in a number of ways. Firstly, they generally employ a common network that cuts across hierarchies and organizational divisions so as to share, mine, analyze and act on large repositories of information. Secondly, because they employ high-speed processors within these networks, the sharing, mining, and analyzing takes place at unprecedented rates of speed. Thirdly, wired governments typically combine sensor, analytic, simulation and networking technology with new operational concepts to enable a dramatically improved sense of reality. Interpretively, they use technologies to model political, economic, operational and social realities.

In today's Macau, traditional barriers to communication and exchange between governmental units have been incrementally lowered mainly due to the interaction among public officers from different units cooperating on the same projects in a learning environment created as part of the e-Macau initiative. With increasingly accurate models and information, public managers in wired governments are expected to respond to changing conditions in dramatically improved ways. In line with the vision of Macau's e-government initiative, newly recruited trainees are now serving as champions and focal points at their respective units for e-government projects, and assisting in interfacing with other units on e-government issues.

Yet another striking impact of the initiative is the emergence of a self-learning culture in government. This is evidenced by the numerous seminars and conference events organized by various governmental units after the first phase of the initiative. Consequently, the wiring in "wired governments" should comprise those things that enable public managers to use ICTs to create new forms of organizational interaction and to manage the governmental units effectively. It is expected that wired governments should apply resources for greatest effect by using real-time information coupled with flexible and highly skilled personnel, research-based approaches, customized communications and command-and-control connectivity to spin decisions loops rapidly enough that mistakes are rendered short-lived, success are timely reproduced, and services are provided satisfactorily.

Hence, becoming wired implies that connections and paths of communications between

government and citizens will change. Boundaries among governing units will change. The nature and effectiveness of managerial control will change, and the knowledge base, both tacit and explicit, on which public managers make decisions will change. In brief, as we switch the physical connections in a bricks-and-mortar government to the wired connections in its clicks-and-mortar counterpart, the neural and cultural networks that human beings have depended on for years to organize work will also be transformed or may need to be changed, too.

The Potential of Community Knowledge Records

The idea behind the community knowledge records (CKRs) is a derivative of two terms: "community" and "knowledge record". Traditionally, a "community" has been defined as a group of interacting people living in a common location. The word is also used to refer to a group that is organized around common values and social cohesion within a shared geographical location, generally in social units larger than a household.

Meanwhile, the word "knowledge record" refers to any kind of recording that is created and kept as something of value. There is currently no universally agreed definition of the word "knowledge"; rather, knowledge is often interpreted in terms of the relationships between data and information.

Hence, a community knowledge record is considered as something of value to the community to be referenced by the governance body for timely decision making. Indeed, the installation of CKRs is to support the e-governance initiative in citizen relationship management (CRM) (O'Looney, 2002, p.96), which relies on ICTs to help public managers and workers understand in a timely manner such things as: the size and scope of current citizen concerns; the speed and direction of emerging concerns; the breakdown of concerns among different constituencies; the underlying causes of concerns among different groups.

With this information, public managers should be able to respond in a timely and appropriate manner to citizens' calls. Basically, a CRM system will enable public service employees who receive communications from citizens to access substantial amounts of information about the citizen that already exist in one or more computer databases while the communication is being received. A sophisticated CKR-based CRM system is also expected to assist the public manager in analyzing concerns (problems or complaints) by type, locality, or other attributes of interest based on the integration of the system with the response and work processes in the related governmental units.

Namely, the CRM system should not just record data about the concern, but should also record data about when the units responded to the call, when the response was completed, which department(s) and personnel were involved in the response, what the government's response was, and how much it costs. More expectantly, by integrating CRM with office automation technology, the system should be able to generate a customized letter or automated e-mail response to the citizen by merging information from database files related to the call or the issue of concern with the word processing or e-mail application.

The Idea of Personalized e-Health Records

The idea of the e-health record as a specific instance of the community knowledge records implies the use of information and communication technologies (ICTs) to improve or enable an individual's healthcare (Spil & Schuring, 2005; Bashshur, 2002; Maia, Wangeneheim, & Nobre, 2006). It broadens the scope of healthcare delivery; citizens are put in the center of services offered by information systems often via the Internet. Indeed, healthcare is one of the industries that are currently fast adopting ICT into their daily use (Kart, Moser

& Melliar-Smith, 2008). Personalized e-health records (PHRs) (Moller & Vosegaard, 2008) have become the major concern of healthcare information management these days.

Yet, even in an age of electronic record keeping and communication, many an existing healthcare industry is still found tied to paper documents that are easily mislaid, often illegible, and easy to forge. In fact, patient data is seldom efficiently organized even within one organization, and when patient data is needed in applications covering several organizations, the situation becomes even more complicated. There is the indication that when multiple healthcare professionals and facilities are involved in providing healthcare for a patient, the healthcare services provided are not often coordinated. Nonetheless, countries that have centralized healthcare systems such as the UK have made considerable progress toward electronic medical records and prescriptions (Kart, Moser, & Melliar-Smith, 2008), including patient access to them.

Despite concerns about security and privacy, such systems provide increased accuracy and efficiency, better communication among healthcare professionals, and reduced risk of prescription errors. Traditionally, a physician writes a prescription on paper and gives it to the patient. The patient carries the prescription to the pharmacy, waits in line to hand the prescription to the pharmacist, who then fills the prescription. The pharmacist might be unable to read the physician's handwriting; the patient could modify or forge the prescription; or the physician might be unaware of medications prescribed by other physicians.

These and other problems indicate the need to improve the quality of healthcare, ease access to healthcare information, and reduce the cost of delivering healthcare. Undoubtedly, with the installation of personalized e-health record (PHRs), representing a patient-centric, longitudinal view of data collected from various source systems, the picture of providing accessible healthcare becomes promising.

For example, the Danish e-health record (EHR) system (Moller & Vosegaard, 2008) is a central patient record publishing system to which all regional hospitals upload extracts of relevant patient data on a regular schedule (nightly). Authorized healthcare professionals can browse the data through a dedicated user interface or extract it for analytical purposes. In other words, every citizen is given a PHR guarded by his or her unique citizen identifier. This PHR carries the longitudinal details of any healthcare incidents including the prescription of medicine by registered healthcare professionals (physician with a unique identifier issued by the government). Authorized professionals are allowed to browse the PHR for relevant information. In Denmark, a healthcare professional's access to a patient's health information is regulated by parameters such as the professional's type of authorization (doctor, nurse, dentist, pharmacist, and others), whether the information is related to a current health problem, whether the professional takes part in the patient's treatment, and whether the patient has consented to passing the information to the professional in question.

More importantly, in Denmark and other countries, patients have the right to give detailed directions about how their health information should be distributed and they can decide that certain information should not be shared or that only certain doctors can access specific parts of their records. Actually, this arrangement of access security is typical in the development of community knowledge records. There must be regulations to allow the owners of the records to set default access rights for some of the data, and customized access rights for others considered as sensitive data. Yet, when it comes to PHRs, the Danish operating philosophy takes into account that no patient should die because a system blocks access to vital data. In Denmark, the EHR system takes the approach that authorized healthcare professionals are allowed to look up any patient registered in the system, but they are prompted

for a self-declaration of the rule according to which access to the patient's health information should be granted.

The fact that they retrieved this information will be logged in the system along with this declaration. The patient can monitor the log by personally signing up to be notified by email when new events are logged. In fact, it has been found (Suomi, 2005) that health professionals seem more reluctant to use the Internet and e-health systems in physician-patient communication owing to the power and responsibility issues of decisions.

The Essence of Citizen Relationship Management (CRM) in e-Governance

Today, the connotation behind the "e" transformation of governance is an important policy issue and surely one that will influence how governments and citizens will interact in the coming decade (Oliver & Sanders, 2004). Clearly, the Internet and the information technologies have the potential to fundamentally change how society is governed and what role citizens come to play in that important process (Garson, 2007). Still, as the "e" prefix becomes affixed to more and more aspects of governance and government operations, it is helpful to clarify the differences between governance and government, and the implications behind their "e" counterparts.

According to Kettl (2002), government is an institutional superstructure that society uses to translate politics into policies and legislation. Governance is the outcome of the interaction of government, the public service, and citizens throughout the political process, policy development, program design, and service delivery. Put it simply, we might say that governments are specialized institutions that contribute to governance.

As for the meanings of their "e" counterparts, Riley (2001) provides a useful description for e-governance: In its simplest sense, e-governance is about the use of emerging information and communication technologies (ICTs) to facilitate the processes of government and public administration. It is about providing citizens with the ability to choose the manner in which they wish to interact with their governments. And it is about the choices governments make about how ICT will be deployed to support citizen choices.

The term e-government, in many instances, is associated with the migration of government information and services to an online delivery platform, the so-called electronic service delivery (White, 2007; Andersen, 2004; Curtin, Sommer, & Vis-Sommer, 2003; McIver & Elmagarmid, 2002; Heeks, 2001). This is currently demonstrated by many a government especially in developed countries to migrate many of their government services to electronic portals.

Indeed, there is little doubt that the Internet and ICTs have helped create the transformative pressures that will dramatically influence the ways in which governments are organized and operated. The transformation of governance structures and processes, enabled by technology, will be embedded in new modes of information exchange, perhaps, more integrated and distributive approaches to operations and service delivery, and a more open and participatory system of policy making. By capitalizing on the Internet revolution, governments can create new channels of communication and new methods for participation via e-government. It is foreseeable that the changing environment, coupled with citizen and business demands, would continue to encourage government involvement in e-government initiatives and related uses of ICTs.

The idea of citizen relationship management is to enable the governance body to better serve her citizens through the introduction of reliable processes and procedures for interaction with these citizens. The context of citizen relationship management in the public sector is similar to that of customer relationship management in the private sector. In the private sector, CRM is an information industry term (searchCRM.com, http://searchcrm.techtarget.com/) for methodolo-

gies, software, and usually Internet capabilities that help an enterprise manage customer relationships in an organized way.

For example, an enterprise might build a database about its customers that describe relationships in sufficient detail so that management, salespeople, people providing service, and mostly the customer could do such things as: directly access information, match customer needs with product plans and offerings, remind customers of service requirements, and know what other products a customer have purchased. Indeed, the major areas of CRM – be it in the public or private sectors – mostly focus on service automated processes, personal information gathering and processing, as well as self-services. It attempts to integrate and automate the various customer/citizen serving processes within a company or a governing body.

In the context of e-governance for citizen participation, it is often suggested that the CRM activities should include the following mechanisms (Wiig, 2004; O'Looney, 2002):

- Create a virtual conference space where citizens are invited to collaborate and communicate with local government staff responsible for heeding citizen concerns at least once a week using such ICT devices as Wiki-based conversational forum. The forum could provide an opportunity for citizens and staff to strategize about trends and developments that could impact government electronic services. Each month the public manager in charge of strategic planning is expected to synthesize the best ideas aired in the virtual forum and presents them in the form of governmental blogs to the citizens as well as to any council or commission.
- Create an online database of citizen concerns and complaints on e-government services as well as that of citizen and staff solutions to common e-governance issues, ordered by variables such as department, work process, district, and timestamp of filing. It is expected that such a database is made searchable and available to staff across all departments (or jurisdiction boundaries). Each month the public manager in charge of strategic planning is expected to synthesize a summary report from the database for effective governance performance improvement.
- Create searchable repositories of time-stamped minutes of meetings, e-mail, documents, notes on conversations, and others – that is, of everything that goes into a decision or the design of a process or service in e-government issues – so that everyone in the government unit concerned can be updated on the issues and can get a sense of the total context in which decisions have been or have to be made.
- Create an online database of expertise which should include information on experts among personnel within government, citizen experts, consultants within the community, and experts from regional or national organizations. It is also expected that such a database must have the ability to provide feedback from government units that have used particular experts or consulting firms.
- Create cross-department knowledge groups that are charged with identifying best cross-cutting e-government practices and setting standards in these areas. It is expected that these groups should create center-of-excellence Web sites that provide online resources as well as skills training for the rest of local government staff.
- Create a feedback mechanism close to the e-government service context. An example is to install kiosks in multiple sites, including sites where citizens would normally be receiving services (such as outpatient clinics from government hospitals). These

kiosks would provide an alternative way to register service when staff is not available as well as a way for citizens to register their level of satisfaction with the services they receive. In this way, citizens standing in line for services can choose to provide information on service satisfaction while they are involved in receiving the service. This on-site feedback mechanism should help ensure that the information is timely and not lost due to decisions to just forget about a particular instance of inadequate e-government service.

CASE DESCRIPTION

Citizen healthcare has always been the concern of the Macau SAR Government since its installation in 1999 when it was returned to China by the Portuguese. The latest program launched in 2009 is the Healthcare Subsidy Scheme, an experimental subsidy program for medical services, through which the SAR Government aims to share with the public the economic outcomes of social development, and alleviate their living burdens. The specific objectives of this scheme based on the officially released information (http://www.vs.gov.mo/cv2/provider_main_2.htm?lang=en) include the following: 1) to promote family medicine concept and draw public attention to personal healthcare; 2) to strengthen the cooperation between private healthcare services providers and public healthcare market, and make full use of medical resources available in the community; and 3) to improve the overall level of the medical services in Macau and diversify the healthcare services in the field. Presumably, this is a potential application to be transformed into another e-government service if its impact turned out to be positive.

Macau's Healthcare Subsidy Scheme 2009

Under the healthcare subsidy scheme of 2009 (commencing in June 2009), each Macau permanent resident is considered as the eligible beneficiary entitled to receive a total of ten healthcare vouchers with personalized identification, each amounting to fifty patacas (MOP50.00) in face value. Namely, a subsidy of MOP500.00 is granted to each permanent resident of Macau, to be consumed in any of the eligible private healthcare units in Macau, which include physicians, traditional Chinese medicine practitioners or herbalists, dentists or odontologists, therapists and healthcare premises that have registered with the Health Bureau of the Macau SAR Government, but are not already subsidized by other Government schemes.

Meanwhile, the use of the healthcare vouchers is monitored by the following regulations:

- Vouchers should be used by August 31, 2010.
- The legitimate use of a voucher can be transferred to the beneficiary's spouse, lineal blood ascendants or descendants within direct kinship (i.e., parents or children), provided that the recipient is also holder of the Macau SAR Permanent Identity Card. To transfer the right of use, the beneficiary should complete the declaration of transfer on the reverse side of the voucher to signify the transfer action.
- When receiving the voucher(s) as payment, the enrolled private healthcare unit should perform the following:
  1. Check the identification information of the voucher user (patient) with his or her identity card;
  2. Check whether the declaration of transfer on the reverse side of the voucher is completed, in case the patient is not the registered beneficiary of the voucher(s)

used for payment. In such cases, the private healthcare units should pay attention to the user's name, identity card number, his or her relationship with the beneficiary of the voucher, and the date of transfer. Special attention should also be paid to ensure that the declaration of transfer is properly signed by the designated beneficiary;

3. Check the authenticity of the voucher(s) with the government-provided ultraviolet detector by checking with the visible emblem of the SAR Government and a hidden anti-counterfeit logo visible only under ultraviolet;
4. Turn down a beneficiary when he or she wishes to overpay the medical service with voucher(s) and have the surplus returned in cash, and should advise the patient to underpay and cover the difference in cash instead;
5. Issue a payment receipt (standard M/7 form) and mark on it the number of vouchers used for the payment;
6. Complete the obverse side of the voucher(s) with the name of the voucher user, the serial number of the payment receipt (M/7 form), and the date of use;
7. Ensure the patient affix the same signature as shown on his or her Macau SAR Permanent Resident Identity Card;
8. Affix an initial signature and a seal of the Service Provider's company stamp on the obverse side of the voucher(s) used for payment;

- The private healthcare unit should keep safe the vouchers received and the M/7 form duplicates or receipt stubs, in order to complete the reimbursement of the vouchers; the last date for reimbursement application is set as September 30, 2010.

The data security and privacy issues behind the implementation of this healthcare subsidy scheme involve the following:

- Voucher contains personal data of the beneficiary and the voucher user. Private healthcare units should treat the vouchers received as confidential information.
- Private healthcare units should properly keep the vouchers received in a safe place, presumably locked to prevent haphazard access.
- Private healthcare units should keep patients' treatment records for authorities' random inspection.
- Private healthcare units and its employees should not disclose any of the personal data on the vouchers exposed to them, or use the personal data for any other purposes. Personal data should be kept confidential with all necessary measures.

The e-Governance Concerns in e-Health Services

Meanwhile, in light of the healthcare development in Macau in the past decade, the Health Bureau (http://www.ssm.gov.mo/design/home_e_fs.htm) of the Macau SAR Government has also observed that effective and timely communication among patients, physicians, nurses, pharmacists, and other medical professionals is vital to proper healthcare provision. It is also understood that communication mechanisms that are based largely on paper records including prescriptions, are inefficient and unreliable (Kart, Moser & Melliar-Smith, 2008).

Yet, in an age of electronic record keeping and communication, connectivity can be undermined by the type of network infrastructure and citizen access. These are closely related but distinct areas of concerns. Networks must exist before citizens can access any e-health system, but this says little about the type of network, its capacity or its ability to serve desired purposes. Today, we

have many different levels of access to a digital network. The amount of access (or bandwidth) determines the quality of service, and to a certain extent, the service type (e.g., video demands higher bandwidth). If governments decide to go digital to provide e-health services, they will be obliged to establish some level of universal service. A key policy question will be how to determine that level within an ever-changing technological environment. Also, when it comes to citizen and public employees' network access to the health-care records, the context of network management regimes and architectures must be well conceived.

Management regimes define questions of when, where, how, to whom, using what software, with whose permission, for how long, and others in the context of accessing the necessary healthcare information. Network architectures embed these and other rules and policies into the management of any healthcare information system (HIS) itself. Indeed, each form of HIS architecture can have a different impact on the type, style, frequency, duration and content of citizen-to-citizen, citizen-to-government, government-to-citizen, public employee-to-government and business-to-government interactions. A poorly designed HIS architecture can limit or create an imbalance in each or all of these interactions, thereby limiting online healthcare provision.

Yet, the ease with which people are able to contact and communicate with others is essential if online communications (connectivity) are to be broadly encouraged. Unfortunately, there can potentially be conflict between the two values: privacy and connectivity. That is, we can ensure greater privacy by putting limits on connectivity (e.g., making it hard to find someone's e-mail address) or ensure greater connectivity by limiting privacy. Ideally, in the context of e-health system implementation, we would be able to discover public policies that would maximize these two public goods as much as possible.

Example e-Health Services in Action

The e-health services selected for discussion here is attributed to (Kart, Moser, & Melliar-Smith, 2008), who developed a distributed healthcare system for use by physicians, nurses, pharmacists, and other professionals, as well as by patients and medical devices used to monitor patients. The discussion hereby focuses on the design philosophy of a healthcare system, with two essential modules of services for elucidation: the clinic module and the pharmacy module.

- *The Philosophy of Service-Oriented Architecture (SOA)*

  The e-health system is designed based on the SOA philosophy, which is aimed to provide the opportunity for diverse systems to interoperate without requiring the use of a particular kind of computer system. This is made possible with the introduction of open standards such as XML and SOAP. SOA, an architecture in which the building blocks are services, supports diverse processing efficiently, enables cross-platform communication, and adapts dynamically to meet changing needs. It not only encompasses the services from a technology perspective but also takes into account the policies and practices that govern service provision and consumption. For healthcare in particular, SOA through incorporating specific healthcare standards (http://healthit.ahrq.gov/) is empowered to enable interoperability by encoding healthcare information using one or more generally agreed upon representations such as the Health Level 7 code (http://www.hl7.org/) to improve the quality of healthcare delivered to patients.

- *The Clinic Module*

  The clinic module supports routine activities of physicians and nurses at the clinic by keeping such information as appointments for a specific day or week, the patients that the physician has examined, and notes related to the patients. The software application for the clinic module renders two interfaces: the Web server interface, and the Web service interface. The former is designed for human user who can access the healthcare services from a Web browser. The latter is designed for software applications and devices to communicate with the clinic module. A physician or nurse can use the Web server interface to access the clinic module from a desktop or notebook computer or a PDA (portable digital assistant), and the patient can use the Web server interface to request appointments with the physician for specific time and date. The Web server is designed to use a Web service to access healthcare data.

Typically, a physician can use a PDA to enter and retrieve information about the patient during or after an appointment and to access the information when needed. The PDA can communicate with a desktop or server using a wireless connection. During the appointment, the clinic module would send prescriptions from the physician to the pharmacy over the Internet using the pharmacy Web service. To locate the pharmacy closest to the patient's home or the physician's office, the clinic Web service sends a Web service query to a Web service registry, where pharmacies offering such services have registered. Communication between the physician and the pharmacy occurs after the physician received a response from the registry.

To ensure accuracy, the physician must confirm the prescribed medication and its dosage upon entry because such information is critical to the patient's life. It is expected that integration with pharmaceutical applications or Web services that warn of interactions between medications can further improve the provided service's accuracy.

- *The Pharmacy Module*

  The pharmacy module provides services to the pharmacist and devices at the pharmacy. It keeps a record of the patient's prescriptions for reference and updates prescription status as the pharmacist fills them. This module also has both a Web server and a Web service interfaces. The Web server interface is typically used by the pharmacist to view prescriptions as the pharmacy receives them from physicians. The patient can use the same interface to determine whether a prescription has been filled and is ready for pick up or delivery. The Web service interface provides access for applications deployed at the pharmacy. The clinic module sends prescriptions from the physician to the pharmacy over the Internet using the pharmacy Web service. The Web service verifies the physician's identity, and also checks the patient's insurance (or payment status) before processing the prescription. It is expected that removing human intervention from communication between the physician and pharmacist and maintaining information electronically reduces the possibility of human error.

Typically, the Web server interface to the pharmacy module allows the pharmacist to monitor incoming prescriptions, update their status, and inform the physician and the patient about the status of the patient's prescriptions. The pharmacist can also query the pharmacy module to obtain the status of prescriptions, the records for a particular

patient, and other information, with query results shown as a list for the pharmacist to view.

CURRENT CHALLENGES FACING THE ORGANIZATION

A major problem in Macau's healthcare today is that communication between the physician and the patient typically exists only within the physician's office. Once the patient leaves the clinic, communication is very limited. Yet, monitoring the recovery progress is essential to proper healthcare (CQHCA, 2000). This problem is even more contextualized for patients hospitalized. It is expected that a distributed e-health system can help solve this conundrum. Medical monitoring devices worn by patient, and frequent electronic communication between the patient and a nurse in charge of recovery care, can ensure that the prescribed treatment is being followed and that the patient is making good progress.

This e-health context can actually be extended to other healthcare professionals, including medical technicians who perform and report tests and analyses requested by physicians. Besides, the e-health system could also be interfaced to other applications that provide information on medications and dosages and warn of interactions between medications. Furthermore, the same system could also be interfaced to drug-delivery devices that prompt and monitor the regular and timely consumption of medications.

In fact, given the progress of technology over the years, many advanced features have become available for e-health system; they are sometimes called *telemedicine* in the literature (Yang, Takahashi, & Fei, 2007; Yajiong & Huigang, 2007). Today, most telemedicine projects focus on teleconsultation between a doctor and his or her patient, or on teleconferencing between two or more doctors analyzing a complex case. It is expected that e-health system in the telemedicine context (Wallauer, Macedo, Andrade, & Wangenheim, 2008) could reduce the costs for patient transport to specialized centers, provide for better source examination control, and promote significant improvement in patient care because it provides faster diagnosis and takes less time to generate a patient medical record. When it comes to personalized e-health records, the advantages of becoming wired are most evident in the management and operation of governments.

In particular, public sector organizations that are responsible for delivering e-health services can use ICT to deliver these services with relatively fewer staff. Moreover, as the number of healthcare units (private or public) needing coordination or the number of medical professionals or personnel entering a healthcare system increases, the communication, standardization and connectivity advantages of getting wired become more evident. Indeed, becoming wired is about shared awareness among dispersed staff empowered to change their behavior in order to achieve the desired impact, and who have to use the technology to increase the pace of operations in healthcare services.

Remarks of Continuing Concerns in Wired Healthcare

The promise of wired government (and so electronic healthcare provision) is that government will be more responsive, coordinated, efficient, effective and accountable. These attributes, rather than the wire that connects people and machines, represent the strategic goals of the government. Nonetheless, using ICT to increase these attributes requires that there first be clear objectives or measures for the attainment of these and other strategic goals. In the context of the discussion presented so far, one example objective is to build up the community knowledge records (CKRs) targeting the needs of citizen healthcare for subsequent e-health provision.

It is believed that simply becoming wired may not help governments in any strategic way unless governments have some strategy in mind. Namely,

one of the important missions for any healthcare information system (HIS) must be positioned to gather data related to the concerns of citizen healthcare, and systematically organize the same with enough measures to balance privacy and connectivity before they are made available as important attributes in the CKRs for e-governance decision-making.

The truism that any healthcare system could support strategic goals should never be forgotten in the rush to be on the leading edge of technology. Forgetting this maxim, public managers often support the construction of information technology systems that make things out-of-focus, and sometimes waste resources.

Information systems are actually more than hardware; they are interlocking sets of personnel, skills, organizational forms, norms and processes. As such, HIS systems represent the epitome of rationalization. Most technical systems are designed for a single purpose, such as e-health, and they allow one to accomplish a complex task quickly and efficiently.

Still, the problem with the vast majority of technical systems is that even as they do a particular thing right, they can make it more difficult to identify the right (strategic) thing to do. This paradox exists not only because there not being enough resources to do *Activity A* because they were spent doing *Activity B*, but because systems by their nature pull attention in a particular direction.

Oftentimes, in building a system for one purpose, there is less time to study and plan to do another thing. In the context of e-health system, it is often the case that the finely specified routines for doing one thing or the expertise or technology needed to do that thing can get in the way of performing well other functions such as building up the necessary community knowledge records for providing long-term e-health services to citizens.

SOLUTIONS AND RECOMMENDATIONS

Becoming a wired organization (such as wired government, or wired e-health system) is a grand goal, but not necessarily a strategic one. There is no one wired organization; rather, there are many wired organizations. It is useful to identify a range of systems from coherent to incoherent. Some wired organizations are coherent in the sense that all the key parts, including the architecture and the displays of the technologies, the norms of the people staffing the organization, the organizational policies and processes, and the funding, incentives and performance measures, all promote the same goal.

Such a coherent system will be desirable, especially when the function being systematized through technology is a routine one and one that does not involve much discretion. Hence, the rationalization of the process that a coherent technology offers is generally commendable.

Nonetheless, wiring can also lead to incoherence. In such a case, one part of the system, for example, the culture of the staff or the incentive system or the organizational routines, may be at odds with the technologies being introduced or with another part of the system. Incoherent systems can create fissures in an organization. In government, such incoherence will typically lead to greater than average inefficiency, large staff turnover, ditched technology, and high levels of duplicated or unused technology investment.

Low-performing governments typically had systems that could not talk with each other and that could not grow to handle tasks. The expectation that governments can grow a system across functions assumes both a level of consistency across governmental functions and a level of software sophistication that traditionally have not existed.

However, the emergency of government information system strategic planning, on the one hand, and knowledge management applications, on the other, may change this situation. This is

also the context of our discussion in this chapter: the design of healthcare information system supported by community knowledge records for citizen healthcare must be viewed as the strategic objectives behind the government's wiring efforts to provide electronic healthcare services to her people to ensure emergence of e-governance at the grass roots.

REFERENCES

Andersen, K. V. (2004). *E-government and public sector process rebuilding (PPR): Dilettantes, wheelbarrows, and diamonds*. Boston, MA: Kluwer Academic Publishers.

Bashshur, R. L. (2002). Telemedicine and health care. *Telemedicine Journal and e-Health*, *8*(1), 5–12. doi:10.1089/15305620252933365

Coe, A. (2004). Transforming government and governance for the 21st century: A conceptual framework . In Oliver, E. L., & Sanders, L. (Eds.), *E-government reconsidered: Renewal of governance for the knowledge age* (pp. 3–21). Saskatoon, Canada: Saskatchewan Institute of Public Policy.

Coleman, S. (2000). *Strong representation: Engaging citizens in a digital age*. Governance in the Digital Economy, Hansard Society.

CQHCA. (2000). *Committee on the Quality of Health Care in America, Institute of Medicine. Crossing the quality chasm: A new health system for the 21st century*. US: National Academy Press.

Curtin, G. G., Sommer, M. W., & Vis-Sommer, V. (2003). *The world of e-government*. Philadelphia, PA: The Haworth Press, Inc.

Eifert, M., & Puschel, J. O. (2004). *National electronic government: Comparing governance structures in multi-layer administrations*. New York: Routledge.

Garets, d. & Davis, M. (2006). Electronic medical records vs. electronic health records: Yes, there is a difference. Technical Report, *Healthcare Information Management Systems Society,* 2006JAN26.

Garson, G. D. (2007). *Modern public information technology systems: Issues and challenges*. Hershey, PA: IGI Publishing.

Gropper, A. (2007). Private health records and the health URL: A patient-centered care team approach to health information management. *Patient Safety and Quality Healthcare*, *4*(3), 28–32.

Handzic, M. (2003). Empowering society through knowledge records . In Wimmer, M. A. (Ed.), *Knowledge management in electronic government* (pp. 262–267). Berlin: Springer. doi:10.1007/3-540-44836-5_27

Hartnell-Young, E. (2006). ePortfolios for knowledge and learning. In A. Jafari & C. Kaufman (Eds.), *Handbook of reseach on ePortfolios* (pp. 125-134). Hershey, PA: Idea Group Reference.

Heeks, R. (2001). *Reinventing government in the information age: International practice in IT-enabled public sector reform*. London: Routledge.

Ip, F. (2009). The road of Macau eGovernment and challenges. *Macau ICT*, *1*(September), 38–41.

Jepsen, T., & Jepsen, M. (2008). Health IT: A roundtable discussion with healthcare information technology executives. *IEEE IT Professional*, *10*(2), 53–55. doi:10.1109/MITP.2008.27

Kahn, S., & Sheshardri, V. (2008). Medical record privacy and security in a digital environment. *IEEE IT Professional*, *10*(2), 46–52. doi:10.1109/MITP.2008.34

Kart, F., Moser, L. E., & Melliar-Smith, P. M. (2008). Building a distributed e-Healthcare system using SOA. *IEEE IT Professional*, *10*(2), 24–30. doi:10.1109/MITP.2008.22

Kettl, D. F. (2002). *The transformation of governance: Public administration for twenty-first century America*. Baltimore, MD: John Hopkins University Press.

Landsbergen, D., & Wolken, G. (1998). *Eliminating legal and policy barriers to interoperable government systems. Phase 1: Policy Barriers. August 12*. Washington, DC: Intergovernmental Enterprise Panel, Office of Information Resources Management, Department of Veterans Affairs.

Lanvin, B. (2003). Leaders and facilitators: The new roles of governments in digital economy. *Global Information Technology Report 2002-2003.* Oxford: Oxford University Press.

Liu, S. (2007). Enabling electronic healthcare information exchange. *IEEE IT Professional*, *9*(6), 17–23. doi:10.1109/MITP.2007.108

Macau (2008). http://www.icegov2008.icegov.org/icegov/events/invitedSession/session2

Maia, R. S., von Wangenheim, A., & Bobre, L. F. (2006). A statewide telemedicine network for public health in Brazil. *Proceedings of the 19th IEEE International Symposium in Computer-Based Medical Systems* (pp. 495-500). IEEE Computer Society Press.

Malkia, M., & Savolainen, R. (2004). eTransformation in government, politics and society: Conceptual framework and introduction. In M. Malkia, A. Anttiroiko, & R. Savolainen (Eds.), *eTransformation in governance: New directions in government and politics* (pp.1-21). Hershey, PA: Idea Group Publishing.

McIver, W. J. Jr, & Elmagarmid, A. K. (2002). *Advances in digital government: Technology, human factors, and policy*. Boston, MA: Kluwer Academic Publishers. doi:10.1007/b116295

Miller, M. (2009). *Cloud computing: Web-based applications that change the way you work and collaborate online*. Indianapolis, Indiana: Que Publishing.

Moller, J. E., & Vosegaard, H. (2008). Experiences with electronic health records. *IEEE IT Professional*, *10*(2), 19–23. doi:10.1109/MITP.2008.25

O'Looney, J. A. (2002). *Wiring governments: Challenges and possibilities for public managers*. London: Quorum Books.

Oliver, E. L., & Sanders, L. (2004). *E-government reconsidered: Renewal of governance for the knowledge age*. Saskatoon, Canada: Saskatchewan Institute of Public Policy.

Osborne, D., & Gaebler, T. (1992). *Reinventing government: How entrepreneurial spirit is transforming the public sector*. Reading, MA: Addison-Wesley.

Paquet, G. (1999). *Governance through social learning*. Ottawa: University of Ottawa Press.

Paquet, G., & Roy, J. (1998). Governance in Canada: Competition, cooperation in business-government-society relations. *Version VI* (Ottawa: University of Ottawa, Fall): 229-230.

Riley, T. B. (2001). Electronic governance: Living and working in the wired world. Commonwealth Centre for Electronic Governance, August. (http://www.electronicgov.net/pubs/research_papers/index.shtml).

Riley, T. B. (2003). E-government vs E-governance: Examining the differences in a changing public sector climate. *International Tracking Survey Report* (No. 4). Commonwealth Centre for Electronic Governance (http://www.electronicgov.net).

Rosell, S. A. (1999). *Renewing governance: Governing by learning in the information age*. Toronto: Oxford University Press.

Rosenfeld, S., Kiss, S., & Siler, S. (2007). *Privacy, security, and the regional health information organization*. California Healthcare Foundation.

Spil, Ton A.M., & Schuring, R.W. (2005). *E-Health systems diffusion and use: The innovation, the user and the USE IT model*. Hershey, PA: Idea Group Publishing.

Suomi, R. (2005). Introducing electronic patient records to hospitals: Innovation adoption paths . In Ton, A. M. (Ed.), *Spil & Roel W. Schuring, E-Health systems diffusion and use: The innovation, the user and the USE IT model* (pp. 129–146). Hershey, PA: Idea Group Publishing.

Tapscott, D. (1997). *The digital economy: Promise and peril in the age of networked intelligence*. New York: McGraw Hill.

Wallauer, J., Macedo, D., Andrade, R., & von Wangenheim, A. (2008). Building a national telemedicine network. *IEEE IT Professional*, *10*(2), 12–17. doi:10.1109/MITP.2008.23

White, J. D. (2007). *Managing information in the public sector*. New York: M.E. Sharpe.

Wiig, K. (2004). *People-focused knowledge management: How effective decision making leads to corporate success*. Amsterdam: Elsevier.

Wimmer, M. A. (2003). *Knowledge management in electronic government*. New York: Springer. doi:10.1007/3-540-44836-5

Yajiong, X., & Huigang, L. (2007). Analysis of telemedicine diffusion: The case of China. *IEEE Transactions on Information Technology in Biomedicine*, *11*(2), 231–233. doi:10.1109/TITB.2006.879599

Yang, X., Takahashi, D., & Fei, H. (2007). Telemedicine usage and potentials. *Proceedings of Wireless Communications and Networking Conference* (pp. 2736-2740). IEEE Computer Society Press.

ADDITIONAL READING

Ancarani, A. (2005). Towards quality e-service in the public sector: The evolution of web sites in the local public service sector. *Managing Service Quality*, *15*(1), 6–23. Available at http://www.emeraldinsight.com/0960-4529.htm. doi:10.1108/09604520510575236

Andersen, K. V. (2004). *E-government and public sector process rebuilding (PPR): Dilettantes, wheelbarrows, and diamonds*. Boston, MA: Kluwer Academic Publishers.

Ciborra, C. (2005). Interpreting e-government and development: Efficiency, transparency or governance at a distance? *Information Technology & People*, *18*(3), 260–279. Available at http://emeraldinsight.com/0959-3845.htm. doi:10.1108/09593840510615879

Coe, A. (2004). Transforming government and governance for the 21st century: A conceptual framework . In Oliver, E. L., & Sanders, L. (Eds.), *E-government reconsidered: Renewal of governance for the knowledge age* (pp. 3–21). Saskatoon, Canada: Saskatchewan Institute of Public Policy.

Curtin, G. G., Sommer, M. W., & Vis-Sommer, V. (2003). *The world of e-government*. Philadelphia, PA: The Haworth Press, Inc.

Davison, R. M., Wagner, C., & Ma, C. K. (2005). From government to e-government: A transition model. *Information Technology & People*, *18*(3), 280–299. Available at http://emeraldinsight.com/0959-3845.htm. doi:10.1108/09593840510615888

Deakins, E., & Dillon, S. M. (2002). E-government in New Zealand. *International Journal of Public Sector Management*, *15*(5), 375–398. doi:10.1108/09513550210435728

Garson, G. D. (2007). *Modern public information technology systems: Issues and challenges*. Hershey, PA: IGI Publishing.

Handzic, M. (2003). Empowering society through knowledge records . In Wimmer, M. A. (Ed.), *Knowledge management in electronic government* (pp. 262–267). Berlin: Springer. doi:10.1007/3-540-44836-5_27

Heeks, R. (2001). *Reinventing government in the information age: International practice in IT-enabled public sector reform*. London: Routledge.

Jepsen, T., & Jepsen, M. (2008). Health IT: A roundtable discussion with healthcare information technology executives. *IEEE IT Professional*, *10*(2), 53–55. doi:10.1109/MITP.2008.27

Kahn, S., & Sheshardri, V. (2008). Medical record privacy and security in a digital environment. *IEEE IT Professional*, *10*(2), 46–52. doi:10.1109/MITP.2008.34

Kart, F., Moser, L. E., & Melliar-Smith, P. M. (2008). Building a distributed e-Healthcare system using SOA. *IEEE IT Professional*, *10*(2), 24–30. doi:10.1109/MITP.2008.22

Kettl, D. F. (2002). *The transformation of governance: Public administration for twenty-first century America*. Baltimore, MD: John Hopkins University Press.

Liu, S. (2007). Enabling electronic healthcare information exchange. *IEEE IT Professional*, *9*(6), 17–23. doi:10.1109/MITP.2007.108

Moller, J. E., & Vosegaard, H. (2008). Experiences with electronic health records. *IEEE IT Professional*, *10*(2), 19–23. doi:10.1109/MITP.2008.25

O'Looney, J. A. (2002). *Wiring governments: Challenges and possibilities for public managers*. London: Quorum Books.

Oliver, E. L., & Sanders, L. (2004). *E-government reconsidered: Renewal of governance for the knowledge age*. Saskatoon, Canada: Saskatchewan Institute of Public Policy.

Saxena, K. B. C. (2005). Towards excellence in e-governance. *International Journal of Public Sector Management*, *18*(6), 498–513. Available at http://www.emeraldinsight.com/0951-3558.htm. doi:10.1108/09513550510616733

The 2008 International Conference on Theory and Practice of Electronic Governance (ICEGOV, 2008DEC(1-4), Cairo, Egypt). Available at http://www.icegov2008.icegov.org/icegov

The 2nd International Conference on Methodologies, Technologies and Tools enabling e-Government, (MeTTeG, 2008SEP(25-26), Ionian University in Corfu, Greece). Available at http://www.access2democracy.org/news/metteg-the-2nd-international-conference-methodologies-technologies-and-tools-enabling-e-governm

Thompson, D. V., & Rust, R. T. (2005). The business value of e-government for small firms. *International Journal of Service Industry Management*, *16*(4), 385–407. Available at http://www.emeraldinsight.com/0956-4233.htm. doi:10.1108/09564230510614022

(United Nations, 2008). *UN e-Government Survey 2008: From e-government to connected governance*. Last retrieved on 2009SEP10 at http://unpan1.un.org/intradoc/groups/public/documents/UN/UNPAN028607.pdf

Wagner, C., Cheung, K., Lee, F., & Ip, R. (2003). Enhancing E-government in developing countries: Managing knowledge through virtual communities. *The Electronic Journal on Information Systems in Developing Countries, 14* (4), 1-20. Available at http://www.ejisdc.org

White, J. D. (2007). *Managing information in the public sector*. New York: M.E. Sharpe.

KEY TERMS AND DEFINITIONS

Community Knowledge Records: Information of value to the community to be referenced by the governance body for timely decision making.

Healthcare: The prevention, treatment, and management of illness and the preservation of mental health through the services offered by the medical, nursing, and allied health professions. Healthcare embraces all the goods and services designed to promote health, including preventive, curative and palliative interventions, whether directed to individuals or to populations. The organized provision of such services may constitute a health care system, which can include specific governmental organizations such as, in the UK, the National Health Service.

Healthcare Information System: An information system designed to support the information exchange of healthcare-related information.

e-Health System: An electronic system designed to support the provision of healthcare.

e-Governance: The use of emerging information and communication technologies (ICT) to facilitate the processes of government and public administration.

Electronic Health (e-Health) Record: A personalized record keeping tracking of the longitudinal details of health treatment including diseases encountered and recovered, and any major experiences of hospitalization.

Wired Government: Also known as the digital government, undergoing the electronic transformation of public services and administration offered by the governance body.