Inquiring Knowledge Management Systems – A Chinese Medicine Perspective

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Abstract

Information Systems/Information Technology (IS/IT) can facilitate superior healthcare delivery. However, studies of IS/IT systems and implementations for Chinese Medicine (CM) practice are very limited. We analyze different inquiring systems and identify that CM can be more easily mapped as a combination of Hegelian and Kantian inquiring systems where multiple perspectives and facts as inputs are considered and analyzed in complicated tasks. These two inquiring systems also have characteristics to cater for formal data analysis but the outcome or solution maybe individual and/or non-predefined. This is important in the context of CM and provides the platform for CM’s individual prescriptions for the same disease in different patients. From this perspective, we explore how IS/IT might be used to support the delivery of CM clinics in their daily operations. This research uses a mixed research method to study a case clinic in the context of CM clinical medicine management system.

1. Introduction

Knowledge management (KM) tools and systems have been considered to be very important to businesses and organizations [14, 28]. Specifically, KM is a “technique aimed at solving the current business challenges to increase efficiency and effectiveness of core business processes while simultaneously incorporating continuous innovation and ensuring a sustainable competitive advantage” [28, p. 15]. Extensive literature can be found in this field ranging from Churchman’s inquiring systems, Nonaka’s knowledge conversion modes and knowledge spiral, to many recent KM studies [28].

KM is particularly relevant in healthcare contexts because the tools and techniques of KM enable and facilitate: 1) better access to accurate and the latest medical knowledge which continues to grow at an exponential rate [21]. 2) the improvement of the quality of clinical decision-making [21]. 3) an increase to performance, development of partnerships, evaluation of risks, better organized management, and the enhancing of economic value [14, 22]. Hence, incorporating KM into healthcare contexts can facilitate superior healthcare delivery [14, 22, 28]. This has been seen in various system developments such as Electronic Patient Records, Clinical Knowledge Management systems, Clinical Decision Support Systems and Materials Management Systems. To date, however, KM has been heavily studied and applied only to western medicine (WM) practice [14, 28]. Healthcare though, is not only restricted to WM. The increasing popularity and demand on complementary and alternative medicine (CAM) worldwide [14, 27] triggers the necessity and urgency to study the possibility of applying KM and its techniques to CAM in order to achieve similar benefits.

CAM practices are different to WM [14, 15]. Perhaps this is one of the reasons why CAM KM technology has not been discussed much in the literature [14, 15]. Chinese medicine (CM), for example, has its roots in philosophy that was developed thousands of years ago and it is very different to WM [14, 15]. CM diagnoses are often individual and the prescriptions are unique even for patients who have the same disease [14, 15]. Further, its diagnosis methods are distinct to WM as CM
Inquiring systems were first defined by Churchman using the following five categories — Leibnizian, Lockean, Hegelian, Kantian, and Singerian [1, 5]. Each of them represents a type of inquiring organization from a system view of knowledge creation, examination, and management [29].

2.1 The Leibnizian Inquiring System

Churchman’s Leibnizian inquiring system is a closed system with a set of built-in elementary axioms that are used along with formal logic and analysis to generate more general fact nets or tautologies [1, 5, 8, 24]. The Leibnizian inquirer is founded on formal rules and heuristics regarding interpretation of information based on what it knows [1, 5, 8, 24]. Organizations that are task-based and routinized fit within this inquiring form [4, 8]. Knowledge creation is limited as the Leibnizian system uses only formal logic and mathematical analysis to make influences about cause and effect relationships [4, 8, 20]. The focus is on reliability and replication. Organizational memory and knowledge expand within its internal boundary to achieve accuracy and repetition; hence, problems that are highly structured with few unknown variables [4, 8, 20] are best. KM in this context is concentrated on manipulating the organization’s explicit knowledge such as documents describing goals, plans, and standard operating procedures [4, 8, 20]. Tacit knowledge is little emphasized in this context which leads to difficulties to adapt and maintain in a changing and non-consequential environment [4, 8, 20].

2.2 The Lockean Inquiring System

The Lockean inquiring system is founded on principles of agreement embedded in classification of observations [1, 5, 8, 24]. Lockean inquiring community members share a common language and mindset supported by strong relationships and communication [4, 8, 20]. Lockean organizations are built around the pattern of development of the beliefs, practices, and rituals of everyday organizational life. These values are passed on, shared and perpetuated within the organization [4, 8, 20]. Learning is a push and assimilation process with guidelines [4, 8, 20]. The Lockean inquiring system fully understand the social environment, adaptability is enhanced through attention to symbolic references such as legends and/or well-respected authorities [4, 8, 20]. Knowledge is socially constructed through observation and discussion. Examples of IS/IT are: repositories such as data warehouses (storing observations), data mining (analyzing the observations), and groupware tools like emails (facilitating the communication and sharing) [4].

Lockean organizations typically exemplify Nonaka’s socialization mode of knowledge creation [4]. Socialization is about sharing individual’s tacit knowledge to those “if the self becomes part of a larger self” [23, p. 674].
2.3 The Hegelian Inquiring System

The Hegelian inquiring system is based on the belief that the best way for knowledge creation is by observing a debate between two conflicting ideas [1, 5, 8, 24]. There are three major players in a Hegelian system [1, 5, 8, 24]. The first player constructs a strong conviction of a fundamental thesis by maximizing supporting materials [1, 5, 8, 24]. The second player does the same thing as the first only with an opposite worldview of the thesis—antithesis [1, 5, 8, 24]. The third player analyzes the debate and constructs a new and larger worldview that is synthesis of the thesis and antithesis [1, 5, 8, 24]. In this style, conflicts and opposing opinions are encouraged [1, 5, 8, 24]. Knowledge is gained by reflecting and resolving often diametrically opposed perspectives [1, 5, 8, 24]. In this process, the synthesis may result in an entirely new strategic direction for a given organization [8]. Hegelian organizations have little structure or formal mechanism for guidance; however, they are assisted by group support systems that include negotiation and arbitration [4, 8, 20]. Knowledge to be managed in such environments consists of information from the three players and the interaction dialogues [4, 8, 20]. IS/IT solutions that support Hegelian inquiring systems include: groupware that is designed to support and facilitate arguments among stakeholders in order to help them understand the specific elements of each other’s proposals; repositories that hold the debate data; document management software and/or analysis tools for developing points to support either the thesis or the antithesis [4, 8, 20].

In a Hegelian inquiring system, knowledge creation can be seen as consisting of Nonaka’s socialization and externalization [4]. Socialization as it involves three players’ interaction and debating. It is through this social process, tacit and explicit knowledge of the thesis and antithesis are externalized [4, 8, 23].

2.4 The Kantian Inquiring System

The Kantian inquiring system is designed to incorporate both multiple perspectives and facts to determine models that are best-fit for the situation [1, 5, 8, 24]. Using Leibnizian fact nets to support its data analysis, Kantian inquiring systems perform various modelling techniques to interpret and explain the causal connections between perspectives and the observations [4, 8, 20]. Kantian organizations depend on communication, organization memory, understanding of the modelling, stability of rules and regulations [4, 8, 20]. In this style, knowledge is managed in both empirical and theoretical approaches [4, 8, 20]. The perspectives can be heavily analytic using multiple analytical methods for interpreting data. Learning is disseminated through group members and KM may be enhanced by the use of a system design to discover and distribute information [4, 8, 20]. The Kantian inquiring system tends to be sensible to the environment [4, 8, 20]. It is focused on flexibility, relationships, organizational development through contingency theory and the best-fit between itself and the environment; hence, it can react quickly and effectively to problems and changes [4, 8, 20]. This type of inquiring system is suitable for moderately uncertain situations, unstable environments and complex problems of high-to-moderate structure [4, 8, 20].

The Kantian approach is closest to that of the functional view, and its Nonaka knowledge creation mode is best seen in Nonaka’s internalization mode which includes both tacit and explicit knowledge [4, 8, 20]. The system uses machine-learning algorithm and models input by experts to analyze incoming information and then adds the processed information/models to the organization’s memory. Examples of IS/IT in Kantian are: World Wide Web (WWW), databases, model management systems, decision support systems, and effective information systems.

2.5 The Singerian Inquiring System

The Singerian system is guided by two basic premises. The first is to establish a system of measures which specifies steps to be followed in resolving disagreements among the members of a community [1, 5, 8, 24]. Disagreement is essential in the Singerian style, as it is the key to different worldviews which leads to improvements [1, 5, 8, 24]. The second premise is the strategy of agreement [1, 8]. When disagreements occur for various reasons, and when models fail to explain a phenomenon, new variables and laws are introduced to provide guidance and overcome inconsistencies [4, 8, 20]. Problem fragmentation or partitioning helps Singerian organizations make sense of the situation by sorting out the known and unknown, then it processes the unknown further, generating cycles of disagreement and agreement until the problem is fully investigated and understood from all sides [4, 8, 20]. This style requires a flat and decentralized structure to promote communication and feedback at all levels and across all units [4, 8, 20].

The Singerian system has the purpose of creating exoteric knowledge for choosing the right means for one’s end [4, 8, 20]. Knowledge must be connected to measurable improvements that are judged not only by
organizational standards but also by what is good and ethical for all of society [4, 8, 20]. From the Singerian system perspective, problems and knowledge domains are non-separable; everything is connected to everything else; from any source, discipline, and profession; and so they are analyzed as wholes [4, 8, 20].

KM in this system is a combination of functional, interpretive and critical views [4, 8, 20]. Knowledge of all forms is considered which include: tacit and explicit, deep and shallow, declarative and procedural, exoteric and esoteric [4, 8, 20]. Nonaka’s socialization and externalization modes are emphasized in the Singerian inquiring system style as a discourse may involve many perspectives [4, 8, 20].

The Singerian approach is best supported by network based IT solutions such as groupware and web-based solutions that allow virtual information gathering and learning that include a wide range of individual stakeholders [4, 8, 20], while repositories and document management systems are supportive tools for the information gathering and dissemination processes.

3. CM and WM inquiring systems

The preceding section described characteristics of each of Churchman’s five inquiring systems. Nonaka’s tacit and explicit knowledge conversion modes were then mapped with each inquiring system and then common IS/IT systems used by each inquirer identified. Now, in this section we identify a suitable inquiring system for CM.

3.1 CM characteristics and requirements

CM started in China thousands of years ago at the time when Chinese philosophy, astronomy and literature were developed to maturity [13]. At that time, experienced Chinese physicians gained knowledge of how to deal with human diseases by natural methods, such as acupuncture, Qigong (mind controlling), and herbs [26]. Further, key individuals began to summarize these practices and thereby developed a theory which formed the origins of CM [26]. Succinctly, CM follows two philosophies: 1) a homeostasis perspective that focuses on the integrity of the human body, and emphasizes the close relationship between the human body and its social and natural environment; and, 2) a dynamic balance perspective with an emphasis on the movement in the integrity [17]. According to these philosophies, life energy is rhythmically channeled through a network of mutual influences between the five elements (wood, fire, earth, metal, and water) and the corresponding organs (liver, heart, spleen, lung, and kidney) of the human body [10, 16, 34]. Table 1 summarizes the key aspects of CM. As can be seen from this table, CM is different and distinct to western medical practice but heavily (perhaps even more reliant) on tacit knowledge and expertise of the practitioner.

As mentioned earlier, CM uses four diagnosis methods. The first method, inspection begins with the physician understanding and predicting the pathological changes of internal organs by observing abnormal changes in the patient’s vitality, colour, appearance, secretions, and excretions [10]. The second method auscultation and olfaction includes listening and smelling. The physician listens to the patient’s voice, breathing, coughing, and sounds emanating from the internal organs. Ear and stethoscope may also be applied in this process [10]. A patient’s “stinky” smell, for example, usually indicates heat syndromes while “foul” and “sour” smell implies retention of food [10]. Inquiring in this context then is about getting information from a patient about his/her disease condition. Examples of common inquiries include chills and fever, perspiration, appetite and thirst, and pain [10]. Regarding palpation, the physician would put his/her first three fingers on the radial artery of a patient’s wrist [35]. A trained and skilled physician can detect over 30 different pulse qualities (e.g. floating, sunken, weak, and bounding) on each of the 12 pulses [35]. The pulse qualities help the physician to identify the condition of the related organs. These four approaches are used in combination in every diagnosis and cannot be separated or omitted [35]. A correct diagnosis can only be made based on a comprehensive and systematic analysis of a patient’s condition at the point of care. This explains why CM diagnosis and treatments are different for the same patient and disease at different times [14]. A study on a group of six people with stomach pain who were diagnosed by a WM doctor and then CM physician has shown significant differences [11]. Based on the knowledge and theory of WM practice of analysing tendency to narrow diagnosis to an underlying entity, the WM doctor used upper-gastrointestinal x-rays or endoscopy by means of a fiberscope, diagnosed all six patients as having peptic ulcer disease [11]. All six patients were given the same prescription [11]. However, the CM physician found the differences in each patient, diagnosed six different syndromes and prescribed six different herbal formulas [11]. The CM physician’s expert knowledge and comprehensive analysis of each patient’s unique health condition is a key which differentiates between the two types of medicinal practices.
CM treatments vary depending on the unique diagnosis of the patient, however they may include: Chinese herbs (i.e. leaves, seeds, roots, flowers, fruits, minerals and animal products), acupuncture and moxibustion, tuina (Chinese remedial massage), cupping, qigong and tai chi, and diet therapy [30]. CM contains as many as 50 species of herbs, and thousands of chemicals [25, 26, 30, 35]. A treatment plan contains a combination of any of the above. A CM herbal remedy prescription is a mixture of multiple ingredients [10, 17, 30]. All treatments aim to increase the human body’s resistance to diseases and prevention by improving the inter-connections and balance among self-controlled systems [17].

WM, on the other hand, generally prescribes treatments for specific diseases, often on the basis of their physiological cause [25]. Drug safety and efficacy are tested in randomized, controlled trials within groups of testers who are diagnosed with the same disease with less focus on their individual health conditions [25]. Pharmaceutical companies and researchers in the western or developed countries have paid some interest in studying CM over the past decade by isolating the active ingredients and testing them one at a time [25]. This approach has led to the US Food and Drug Administration (FDA) approval of drugs such as artemisinin for malaria, which is used to treat fever in CM [25]. However, to truly understand and drill down into the deeper elements of CM treatments, one must study the ingredients inter-reaction and compound efforts and effects as well as the philosophy (e.g. Yin-Yang balance).

### 3.2 Inquiring system for CM

The unique characters, diagnosis, and treatments of CM as described indicate that CM healthcare is a complex open environment. There are many variables, inputs, and perspectives to consider and communicate. This is a feature common to Kantian inquiring systems as it generates hypotheses on the basis of the inputs received from various knowledge sources [1, 5]. The Kantian inquiring system is also able to use explicit and tacit knowledge to consider the many interpretations of the inputs. Knowledge is compared allowing the inquirer to consider ways and/or different modelling to create and incorporate new knowledge [1, 5].

We can also see that CM exhibits features common to Hegelian inquiring systems since CM tries to resolve conflicts and proposes enlarged synthesis. As a result the problem is not only solved but completely dissolved [5, 8, 20]. Hegelian’s ability to understand all behaviors, forms, processes, arguments, and technologies [5, 8, 20] support CM’s comprehensive and systematic view of human diseases. CM philosophy emphasizes inner self-controlled system connectivity and balance between Yin and Yang energy [10, 17, 34]. Any disorder is a result of failure and/or imbalance of the system [10, 17, 34]. Hence resolve, strength, and rebalance the system with duality wisdom [29] is a key in CM practice.

Additionally, as Kantian and Hegelian systems rely on Leibnizian inquiring systems fact net to generate knowledge [4, 8, 20], then Leibnizian inquiring systems also need to be used as part of the knowledge base for this study. These include: repositories; models; Chinese Medicine Board of Australia (CMBA) information, regulation, and guidelines for CM practitioners in Australia [2]; a Chinese Medicine Portal which serves as an online CM knowledge pool where information and clinical data can be retrieved and accessed [32]. Furthermore, Singerian inquiring systems’ strong emphasis on ethical conduct is extremely important to any healthcare information system and is thus also relevant in the CM context; patient autonomy, welfare and social justice must be considered and built-in as principles and guidelines.

### 3.3 WM Inquiring systems

In general, healthcare information systems have been largely developed to produce expert systems, theorem-proving systems, problem-solving and decision-support systems, algorithm-generating systems, databases, and repositories in WM [6, 12]. These developments are mostly in the categories of Leibnizian and Lockeian inquiring systems. As
mentioned earlier Leibnizian systems create fact-net, expert systems perpetuate experiential knowledge. For example, electronic knowledge repositories, storing codified knowledge for future reused. Clinical decision support systems in WM, e.g. linking characteristics of patients with chest pain to software algorithms recommending specific action [6]. Such decision support systems (DSS) take information from various data sources and use these data to provide assistance with the structured portion of the semi-structured decision [24]. This is an early form of a Kantian inquirer, as the human decision maker must rely on intuition and experience to assist them with the unstructured portions [24]. This is typical, to date, in IS/IT designed for WM.

Singerian inquiring systems great emphasis on ethical behavior can be seen to date in most health information systems (HIS) where medical ethics and professionalism are mandatory and expected to maintain strictly in practice. An example of this is a DSS which is developed and implemented with the guidance and principles of patient safety, quality performance, regulations, and policies [24].

Table 2 illustrates the inquiring systems based on a comparison of CM and WM. From this table, we can see the different IS/IT design and development focus between the two types of medicine practices. As mentioned earlier, WM IS/IT developments to date are mainly in the Leibnizian and Lockean inquiring systems with Singerian inquirer’s ethical guidance; they are highlighted in a dark color. Further, research tends to indicate some early Kantian inquiring systems using DSS in WM; this is highlighted in a lighter color in Table 2. Regarding CM IS/IT developments, this research suggests that this should be primarily in the category of Hegelian and Kantian inquiring systems (highlighted in a dark color) with the support and principles from Singerian and Leibnizian inquiring systems (highlighted in a lighter color). No color, or white in Table 2 represents no IS/IT solution to date that fits this type of inquiring system respectively in WM or CM.

<table>
<thead>
<tr>
<th>Inquiring Systems</th>
<th>Western Medicine</th>
<th>Chinese Medicine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hegelian</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kantian</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Singerian</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leibnizian</td>
<td></td>
<td></td>
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<tr>
<td>Lockean</td>
<td></td>
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</tr>
</tbody>
</table>

Table 2. Mapping inquiring systems to CM and WM

4. KM systems and CM developments

KM systems are designed and developed to support and enhance knowledge intense tasks, processes, and projects for the purpose of knowledge creation, storage, retrieval, transfer, refinement, reuse, revision, and feedback [18]. Typical KM system architecture contains data and knowledge sources; infrastructure services; integration services; knowledge services; personalization services; and access services [18, 19].

Data and knowledge sources include organizational internal and external information and knowledge, data warehouse, document management, personal information management, contents from the Internet, WWW, and groupware [18, 19]. Through the case study, this research analyzes the CM clinic’s information and knowledge in the above mentioned categories. For example, how does the clinic manage its medicine documentations? What are the key elements in managing this with IS/IT?

Infrastructure services provide basic functionality for synchronous and asynchronous communication, data and electronic asset management, extraction, transformation, and loading [18, 19]. For example, intranet infrastructure services provide messaging, teleconferencing, and file transferring [18, 19]. In this case the research looks into the clinic’s IT infrastructure services for messaging and files transferring.

Integration services help to meaningfully organize and link knowledge elements from a variety of sources. Integration is often used to analyze the organization knowledge base and manage the multidimensional metadata [18, 19]. For this, the research looks into how the clinic manages external information and knowledge such as films and laboratory test results in assisting diagnosis and treatments.

Knowledge services involve 1) discovery functions such as searching, mining, navigation, and visualization [18, 19]. 2) publication functions like structuring, formats, and contextualization [18, 19]. 3) collaboration functions include skill/expert management, knowledge sharing, awareness, and experience management [18, 19]. 4) learning functions that use tools and techniques for authoring, managing courses, tutoring, learning paths, and examinations [18, 19]. In this category, the research analyzes if any expert knowledge system is used in the clinic; if the physicians use any decision support system in assisting diagnosis and treatments; how does the clinic manage its reporting and standards required by the CM authorities?; how do the clinic practitioners search, order, and manage their medical/drug/herb information?; what are the major concerns and key elements in this area when using IS/IT?

Personalization services can organize a portion of the KM system contents and services for specialists.
and/or specific roles [18, 19]. For example personalized or role-oriented knowledge portals. Access services manage authentication, translation and transformation for diverse applications and appliances [18, 19]. Examples of this are: browser, file system, personal information management and digital assistant [18, 19]. For this, the research looks into if there are any personal devices and applications that the practitioners are using or like to use; how the clinic manages these personalization services. User access level of the clinic medicine practice will also be studied.

The above key KM systems architecture and characteristics are important elements which must be considered in CM developments. Table 3 summaries the inquiring systems that are suitable for CM information systems.

Research shows that much development has been done in WM IS/IT systems [3, 14]; some examples include:

- A scheduling resources or facilities system to manage registration which includes booking and scheduling such as Patient Administration System (PAS) [3, 14, 15].
- Electronic Medical Record (EMR) systems [3, 14, 15].
- Medical Document Management information systems (MDM) [3, 14, 15].
- Clinical Knowledge Managements (CKM) and Clinical Decision Support systems (CDS) [3, 14, 15].
- Human Resources Management Systems (HRM) [3, 14, 15].
- Facility and Equipment Management Systems (FEMS) [3, 14, 15].
- Supply Chain Management systems (SCM) [3, 14, 15].
- Healthcare network/system and security systems [3, 14, 15].

We envisage that in time in particular CM and CAM in general will also develop IS/IT solutions to support their activities and thereby facilitate superior healthcare delivery, analogous to how IS/IT is supporting improved healthcare delivery in WM.

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Lockeans</th>
<th>Singerians</th>
<th>Leibnizians</th>
<th>Kantians</th>
<th>Hegelians</th>
<th>KM Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goals, decisions, standards, procedures</td>
<td>Units, standards</td>
<td>Fact net</td>
<td>Knowledge sources, organization memory</td>
<td>Mission statements</td>
<td>Data and knowledge sources; infrastructure services;</td>
<td></td>
</tr>
<tr>
<td>Organization memory, structure, and culture</td>
<td>System of measures</td>
<td>Standards, operating procedures, rule base</td>
<td>Tacit and explicit knowledge, working theories</td>
<td>Opposing views</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negotiation, communication, consensus building</td>
<td>Use variables to overcome inconsistency</td>
<td>Cause and effect analysis, inference</td>
<td>Knowledge scanning, association building</td>
<td>Arbitration</td>
<td>Integration services; knowledge services;</td>
<td></td>
</tr>
<tr>
<td>Ambiguous reduction</td>
<td>New measures, exoteric knowledge</td>
<td>Error detection and correction, suggested course of action</td>
<td>Integrated and timely knowledge</td>
<td>Conflict resolution, enlarged perspective, new strategic direction</td>
<td>Personalization services; access services</td>
<td></td>
</tr>
<tr>
<td>Socialization</td>
<td>Socialization, externalization</td>
<td>Combination</td>
<td>Internalization</td>
<td>Socialization, externalization</td>
<td></td>
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</tbody>
</table>
5. Methodology

This research uses Case Study (CS), and Design Science (DS) methodologies to guide the various research activities. CS is a commonly used and well-recognized research strategy in Healthcare Services and IS research [33]. It attempts to examine a contemporary phenomenon in its real-life context [33]. Through a typical single CS, the research domain can be examined and a deeper understanding of the key and critical circumstances and conditions can be unearthed [7, 33]. Additionally, CS tools and techniques such as semi-structured interviews, thematic and artefact analysis provide valuable data and information for developing the CMCMS and thus will be incorporated. In selecting the case clinic, this research will use a range of selection criteria which include clinic size; number of patients; number of clinic staff; stock control and supply. The chosen clinic is in Melbourne, Australia.

DS methodology has its roots in the field of engineering and science [9]. It “seeks to create innovations that define the ideas, practices, technical capabilities, and products through which the analysis, design, implementation, management, and use of information systems can be effectively and efficiently accomplished” [9, p.76]. DS has been commonly used in IS/IT research. It is often used in developing executive information systems and system support emerging knowledge processes with effective development methods and system solutions for particular user group requirements or [9]. This study will go through four research processes of DS: 1) identifying the research problem: conducting a literature review; and organizing the data. In this process semi-structured interviews will be carried out in the case clinic guided by the interview questions. Data will be collected, and categorized. 2) solution design: a solution framework and structure will be crafted for the research problem. The existing clinical (as-is) situation will be modelled and analyzed, and then the new (to-be) system will be designed. A range of IT tools and techniques will be used in designing the system solution, these include: Business Process Modelling, Unified Modelling Language (UML) diagrams, and prototyping. 3) evaluation: the prototype and modules of the proposed system will be evaluated with specification, expectation, and precise scope. 4) research completion: research findings will be summarized and published.

6. Conclusions

This research investigates the possibility and suitability of an IS/IT system solution - CMCMS for CM clinics and practitioners. Recognizing the unique and different aspects of CM as compared to WM practices, it is necessary to look into the basics of KM systems and define a suitable system and approach for CM IS/IT developments, in order to design an appropriate IS/IT solution to fit and support the needs of CM practice. To do this, we analyzed Churchman’s inquiring systems, Nonaka’s knowledge conversion modes, as well as KM system architecture characteristics. From these theories, we have tried to demonstrate that CM practice follows a combination of Kantian, Hegelian and Singerian inquiring systems as well as the Leibnizian inquiring system in the form of fact net. The research adopts case study and design science research methodologies to guide and carry out the research activities through four phases. The CMCMS prototype will be designed and developed. CM clinics and practitioners will participate in the testing and evaluation, their feedback will be taken to further refine and enhance the system.

This research serves to contribute to CM practice in the following ways: 1) encourage a nationally and internationally recognized and registered CM practice. 2) provide a IS/IT solution for CM clinics and assist them migrating from manual system to IT solutions. 3) provide reference for future CM IS/IT developments and studies. In addition, it has a significant contribution to theory; namely it is one of the first, if not the first study to apply Churchman’s inquiring systems into the context of CM and CAM and differentiate them from WM.

In closing we note that this research is focused on the development of CMCMS. Other systems such as PAS, CKM, CDS, and FAS will form the focus of future studies. Regarding the limitation of using one case study representing a typical Australia CM case clinic, future studies will also address this by extending analysis to include more case clinics nationally and internationally.

7. References

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