Association for Information Systems
AIS Electronic Library (AISeL)

ACIS 2010 Proceedings | Australasian (ACIS)

1-1-2010

# Electronic Documentation in Residential Aged Care Facilities – A Review of the Literature on Organisational Issues and Early Findings on Initial Conditions from a Case Study

Kieren Diment
*University of Wollongong*, kdiment@uow.edu.au

Ping Yu
*University of Wollongong*

Karin Garrety
*University of Wollongong*

Follow this and additional works at: http://aisel.aisnet.org/acis2010

Recommended Citation
Diment, Kieren; Yu, Ping; and Garrety, Karin, "Electronic Documentation in Residential Aged Care Facilities – A Review of the Literature on Organisational Issues and Early Findings on Initial Conditions from a Case Study" (2010). *ACIS 2010 Proceedings*. Paper 81.
http://aisel.aisnet.org/acis2010/81

This material is brought to you by the Australasian (ACIS) at AIS Electronic Library (AISeL). It has been accepted for inclusion in ACIS 2010 Proceedings by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact elibrary@aisnet.org.

# Electronic documentation in residential aged care facilities – a review of the literature on organisational issues and early findings on initial conditions from a case study.

Kieren Diment
Ping Yu
School of Information Systems
Faculty of Informatics
Email: kdiment@uow.edu.au
Karin Garrety
School of Management and Marketing
University of Wollongong, NSW 2522, Australia

## Abstract

*This paper discusses the theoretical rationale for an empirical study of organisational change arising from introduction of electronic nursing documentation in residential aged care facilities. The study draws on a processual view of organisational change, which is related to the theory of complex adaptive systems. First we review existing literature on electronic nursing documentation with an organisational focus to provide a context to help outline the research aims of the present study. Then we describe a method to explore the hierarchical nature of the work environment based on the sociological theory of Institutional Ethnography. Finally we use this approach to describe the differences in initial conditions between two different sites implementing the same software over the same timeframe. Results suggest that our method is sensitive enough to detect subtle but substantial differences in initial conditions between the two study sites.*

**Keywords**

Change management, computer based nursing documentation, electronic nursing documentation, residential aged care, long-term care

## INTRODUCTION

Change management issues arising from health informatics implementations are frequently highlighted in the literature as worth further investigation, but are seldom the central focus of research. This paper discusses methods and an approach to studying organisational change following the introduction of electronic nursing documentation in residential aged care facilities. It is composed of four sections. The first section outlines literature on the processual approach to change management – a well recognised approach to studying change in the mainstream organisation studies literature, but little used in the field of health informatics. The second section examines relevant literature on electronic nursing documentation with a focus on organisational issues, in order to ground this research project in the context of the field it is operating in. The third section outlines the research aims, and the methodology used to achieve these aims. The final section outlines the preliminary findings from investigating the organisational change at pre/early-implementation stage, at two different residential aged care facilities belonging to the same organisation.

## CHANGE MANAGEMENT, COMPLEXITY AND THE PROCESSUAL APPROACH TO STUDYING CHANGE IN ORGANISATIONS.

While there is a substantial body of work on the theory of change management in the health informatics literature, mainly originating from Bonnie Kaplan and Nancy Lorenzi (e.g. Kaplan 1997; Lorenzi and Riley 1995), empirical studies are uncommon. A PubMed search of the term *change management* found a total of 481 papers on the topic, but only 48 of these were in the field of health informatics. These studies focus on (i) specific implementation projects where change management issues are a secondary consideration; (ii) upcoming informatics implementations, and the relevance of change management issues in planning, or (iii) theoretical concerns along the same lines as Lorenzi and Kaplan's work cited above. The search yielded only two studies with a strong change management focus, yet both lack a holistic approach, rather they focused on nurses' experience (Alexander et al. 2007), or on literature (theory) rather than the experiences of the staff within the studied organisation to understand the change management issues (Upperman et al. 2005). However, we know that other studies of change management are not detected by these search terms (e.g. Yu et al. 2010), indicating that a lack of standardised terminology in this field may inhibit the ability of practitioners to locate and apply

empirically based research findings on change management to their situations. This is compounded by the space requirements in typical academic journal articles and conference papers. According to Dawson and Buchanan (2005), change management studies are narratives about "multiple voices [and the] construction of contested realities". This can lead to "limit[ed] use of primary data", which leaves readers with "the processed outcomes of an opaque analysis".

Given this context, and lack of prior empirical work, we need to look to the wider literature in the field of organisation studies in order to understand how to describe the change management issues inherent in introducing electronic nursing documentation. One challenge we have experienced is the academic literature on the management of change is extremely large.

We have previously published work on the rationale of using complex adaptive systems to understand organisational change processes within health informatics (Diment et al. 2010). This paper examined the links between the study of complexity as a quantitative discipline with roots in mathematics and physics and the field that studies social complexity, with specific reference to early data gathered for the present study. By the time this paper was completed, we became aware of the processual approach to change management (e.g. Pettigrew 1997; Buchanan and Dawson 2007). Therefore, the relationship between the processual approach and the complexity approach will be discussed in the remainder of this section.

Van de Ven and Poole (2005) argue that the study of change has ancient roots pre-dating Socrates. It thus pre-dates the scientific method. Two different views of reality first expounded by the ancient Greek philosophers Democritus, and Heraclitus have influenced the understanding of change. Democritus theorised that reality can be represented as the relative position of stable objects whose relations change in space and time. Alternatively, Heraclitus claimed that reality can be viewed more dynamically, where the objects themselves are in flux, and do not maintain stability over time. Van de Ven and Poole use these perspectives to construct a two dimensional framework for studying organisational change. In the first dimension, the epistemology of understanding change is divided into variance and process methods. Variance methods concern the identification of underlying variables that are related to the anticipated organisational change, and examine how these variables change over time. Process methods are related to a narrative approach to understanding the experience of the different actors involved in an organisational change, and how they describe the organisational system during the course of adapting to the change within the organisation(s) under study. The second dimension is the ontology of the organisation – whether it is a discrete object which is the focus of change, or if the organisation is viewed as a set of actions (or processes) in which change is manifest or embedded leading to the idea of the organisation as a self organising system which changes over time.

Combining these two dimensions leads to four distinct but potentially complementary ways that organisational change can be studied. The variance approach combined with the organisation as a discrete entity view leads to studies dominated by statistical methods, and the use of statistical analysis with hypothetico-deductive methods. The variance epistemology combined with the organisation as process ontology leads to studies based on dynamic modelling, often using agent-based simulation. This approach is compatible with the American school of complex adaptive systems described by Maguire et al. (2006). The process approach combined with the view of organisation as a discrete entity leads to the use of narrative to describe events, and how they lead to a sequence of change within the organisation. By contrast, the process approach combined with the organisation as a dynamic entity view leads to studies where narrative produces an account of emergent properties within the situation, an approach consistent with the European school of complexity (Maguire et al. 2006). The present study is mainly focused on the organisation as process, and change as narrative. The primary reason for taking this approach is that it is very difficult to identify in advance what the important variables are in understanding the processes that underlie change emerging from the introduction of electronic documentation in our situation.

## A BRIEF SURVEY OF PREVIOUS LITERATURE ON ELECTRONIC NURSING DOCUMENTATION WITH AN ORGANISATIONAL FOCUS

Nursing documentation is a significant part of the clinical information stream across the health industry. It provides a systematic framework for nursing practice encompassing assessment, definition of patient problems, recording of nursing aims, planning of nursing tasks, execution of these tasks, and evaluation of care and care planning (Ammenwerth et al. 2001). From examination of the literature on the topic of electronic nursing documentation, we performed Google scholar and PubMed searches on the terms "computer based nursing documentation" and "electronic nursing documentation". The results were screened according to the process given in Figure 1. We identified 41 papers on electronic nursing documentation in 20 subcategories (with each paper belonging to one or more subcategories). The categories most important to the present research were on system evaluation (15 publications), qualitative studies (4), and complexity (3). It is important to note that while there were eight studies on residential aged care facilities and electronic documentation, none of these focussed on organisational issues. We discuss the publications most relevant to the present study below.

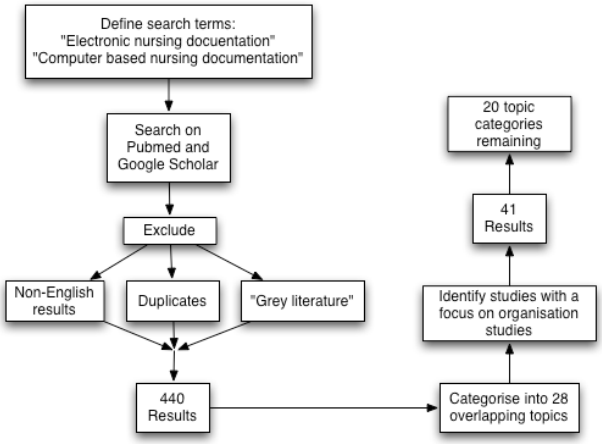


Figure 1 Process used to survey literature on electronic nursing documentation or computer-based nursing documentation

The eight papers categorised under "methodology" mainly focused on general methods for evaluation studies. Of interest to the present study is the discussion on the need for qualitative methods to complement quantitative methods for evaluation research (Ammenwerth et al. 2003).

Of the evaluation studies of electronic nursing documentation with an organisational focus, one PhD thesis evaluated the organisational effects of enhanced inter-professional communication in an intensive care unit (Collins 2009). Also in intensive care, Rikli et al. (2009) investigated issues pertaining to the management of implementation of electronic nursing documentation from the perspective of quality management and the clinical microsystems approach (Nelson et al. 2007). This is a valid approach for implementation management, but is of limited relevance to the change management perspective of the present study as it has a much more clinical focus. Intensive care seems to be a popular environment in which to study electronic nursing documentation, perhaps because of its clinical intensity, high level nursing work, and requirement for high quality documentation.

A further evaluation of organisational issues examined the acceptance of electronic nursing documentation in a rural hospital in the USA (Whittaker et al. 2009). The study drew on specific behavioural issues as enumerated by the Staggers and Parks Nurse-Computer Interaction Framework to examine barriers and facilitators to the acceptance of electronic nursing documentation in the hospital setting (Staggers and Parks 1993). Further investigation of this framework is needed to determine its suitability for evaluating behavioural and situational aspects of change management issues related to the implementation of electronic nursing documentation. However it does not appear that this framework can adequately explain the complexity of change management embedded in the highly connected multilevel interactions inherent in the healthcare industry. This is because the framework emphasises change at the level of management and outcome, but does not consider the intricate, often political aspects of the human and organisational issues which are at the centre of this process (Dawson and Buchanan 2005).

From very early in our project (described below), we identified the importance of complexity for explaining organisational change within the health setting (Diment et al. 2010). Our observation from an initial overview of the literature was that the vocabulary of complex adaptive systems was quite common within the health informatics evaluation literature (e.g. terms like emergence, interaction, wicked problems, the highly interactive inter- and intra- organisational consequences of change). However, there have been few explicit attempts to link these concepts to the implementation of IT in healthcare. Given this, and the small number of publications on organisation issues in electronic nursing documentation, it is unsurprising that only three publications on complexity were identified. Aside from our own work, the two remaining publications on organisational complexity pertaining to implementation of electronic nursing documentation are PhD theses.

Engesmo's (2008) thesis reported on organisational changes affecting nurses following the introduction of electronic health records in Norwegian hospitals. This project has some perspectives in common with the present study. The primary sociological perspective used is symbolic interactionism (Manis and Meltzer 1972). This theory is often used in qualitative empirical work investigating the interactive nature of social life. A social consensus (intersubjective) view of the construction of reality is important in this type of research, because the researchers are the instrument used for conducting the research, collecting and interpreting data. Engesmo also uses complexity theory in his research in order to account for the "patterns [which] emerge unpredictably from interaction embedded within a micro- and macro- level environment" (Engesmo 2008 p. iii.) An important difference between Engesmo's study and the present one is that his research was participative action research,

and, as a participant, he had input into the implementation and management of the electronic documentation system.

There were two main empirical components of Engesmo's study, the change of practice of nursing handover caused by the implementation of the electronic system, and secondly the introduction of electronic nursing care plans. The change in practice from exclusively verbal handover (informing staff of what happened during the previous shift) to "silent handover" comprising two-thirds of the allotted time where nurses just read patient notes, and one-third verbal handover. The verbal time was generally for information not documented due to being "subjective or uncertain". The non-professional nurses were not required for parts of the verbal handover process, and so were available on the floor for longer. It was found that the change from the exclusively verbal shift handover resulted in reduced handover time, increased relevance, and better control of confidential data. The successful implementation of this change in practice improved nursing documentation, and the more efficient dissemination of workplace knowledge.

The second change in practice was the move to electronic nurse care plans (ENCP). This implementation was more problematic. With no guidance from senior management, but an implied managerial desire for an immediate use of ENCP, this implementation resulted in substantial user resistance. Allowing the individual working unit managers to stage the implementation of ENCP ameliorated this problem somewhat, but did impair Engesmo's ability to draw conclusions about the change management issues surrounding ENCP in the timeframe available for his research.

The second PhD thesis was by Todd Swinderman (2005). Again this focused on nursing documentation in hospitals, specifically on the management issues pertaining to the implementation of an electronic documentation system from the perspective of IT professionals. Swinderman as a nurse administrator was, the same as Engesmo, engaged in participative research. In this case, Swinderman was a member of the technical implementation team. The focus of the research was thus on discerning the needs of implementers for understanding hospital nurses requirements in order to provide software that meets their needs. While the approach and findings of this research are outside the scope of the present study, which is an observational study of an already deployed electronic nursing documentation, the methodological justification of the thesis is of interest. As with Engesmo (2008), Swinderman appeals to complexity theories, although with a greater emphasis on the nursing literature's use of chaos theory as a metaphor. By contrast, Engesmo's citations on complexity theory were more generic works from organisation studies. Likewise, while Engesmo appeals to symbolic interactionism to account for the intersubjectivity inherent in the change management process, Swinderman appeals to phenomenology, a related theory. Swinderman places greater store on complexity theory rather than more sociological theories, as his methodology combines quantitative and qualitative data (mixed methods). He suggests that complexity, with its roots in mathematics and physics, can provide a bridge between the two approaches.

While both Engesmo and Silverman cover similar areas of research, using similar theoretical frameworks, the citations used to justify the approach have very little overlap. Although this may indicate a difference in perspective of the research projects, it is also possible that due to the very large amount of literature from sociology and social psychology that deals with the issues of intersubjectivity, similar conclusions can be reached from different sources. Given this large volume of literature, and the challenge of having to constrain it to a manageable reading list, the difference in sources from the two authors, while not surprising, is worth noting, in order to explore the criteria for a 'good enough' research methodology for this kind of research. Aside from the focus on residential aged care facilities rather than hospitals, the key difference between Engesmo's and Silverman's research, and the present study is that our research is observational, and not action research. This is because in our case the researchers are external to the organisation being investigated and are not involved in the decision making process. Therefore the aims and methodology will be somewhat different. These are detailed in the next sections of this paper.

## RESEARCH AIMS

With respect to the present study, we take the view that residential aged care facilities and management groups should be seen as dynamic organisations, responding to changes in their environment such as new technologies and regulations, and changing staff and resident demographics, among other factors. As this process-based view is central to the present study, and as process can be understood by developing a narrative through the analysis of longitudinal interview data, it is important to clarify what is meant by the term narrative.

Buchannan and Dawson (2007) claim that the development and use of narratives in organisational change research must account for their polyvocal properties, which emerge from the mainly interview-based data which are the most common data collected in this kind of research. As a result, narrative does not represent a linear story as in the literary sense, but is a "multi-story process" guided by the researcher to shape an explanation of events to provide an account of change. This account is sensitive to the needs of the different actors in the

situation being researched. This is very important, and central to the purpose of this study because generating this polyvocal narrative is not an end in itself, but provides a means of answering broader research questions. Once these narrative accounts have been developed, we can use them to answer more specific research questions relating to *resources, strategies*, *process* and actors, namely how resources, strategies and processes were mobilised to effect change, and the outcomes of those mobilisations. Resources, strategies and processes are central concerns of organisations adapting to their environment (Miles et al. 1978), while actors also play a central role in shaping the relationship of the organisation with the environment. We hope that this structure for understanding change can situate the analysis of research data in a way which facilitates a systematic approach and accounts for the conformation of both the internal and external environment. The results presented later in this paper show how accounting for these factors can be used to help structure our findings.

**Our Approach**

In the field of health informatics, there is a conflict between a positivist, experimental view of health informatics, and a less constrained sociological view, which considers the importance of experience and the socially constructed intersubjective nature of social life. The differences in approach are well summarised by Kaplan (2001). Intersubjectivity refers to "the common sense shared meanings constructed by people and their interactions with each other and used as an everyday resource to interpret the meaning of elements of social and cultural life" (Seale 2004 p. 508). The majority of health informatics evaluations (the present study being type of qualitative evaluation itself) do not take this approach. Instead, they are dominated by quantitative work, with 80% of evaluations surveyed in a systematic literature review between 1982 and 2002 being primarily quantitative studies. Only 5% of studies were exclusively qualitative in focus, while the rest either used mixed methodology or did not specify their methods (Ammenwerth and de Keizer 2005). Since the publication of this inventory, the authors have continued to add articles to the database (available at http://evaldb.umit.at) with the number of exclusively qualitative studies increasing to 18%, and mixed methods increasing to 29% between 2003 and 2009. While quantitative work is useful in situations where relatively large samples are required and available, they cannot capture the intricacies and subtleties of lived experience for which qualitative methods are much more appropriate. This latter approach is required for understanding the trajectory of change being researched in this paper.

The most common method for qualitative research in organisation studies and health sociology is Grounded Theory (Glaser and Strauss 1967), a systematic data-driven approach, which is a reversal of the usual scientific method. Instead of generating hypotheses at the beginning of the research process, transcript and other data are coded to identify emergent themes. The themes are then used to refine and test the generated hypotheses via an iterative process of *continuous comparison*. However, examination of the use of grounded theory in health informatics research suggests that while it seems well suited to micro-social situations with a limited range of actors (e,g. Irurita, 1996; Embi et al., 2004; Hendy et al., 2007), the risk of information overload is high (Miles 1979). This makes the study of rich macro-sociological comparisons, such as that required in the present study, difficult. The dominance of the grounded theory and statistical approaches to data analysis in many areas of management-focused social science research has resulted in a range of methodological issues. In the organisation studies literature in general there is a strong tendency for qualitative methods to be insufficiently detailed to allow a paper's readership to understand the procedures used to analyse the data. This problem has become more widespread in recent years; in part due to the way that much qualitative data analysis software encourages a formulaic analysis (Jones and Diment 2010). Cautions about a procedural checklist approach based on the epistemology of quantitative research are a recurring theme in the literature (e.g. Barbour 2001).

The focus of our research on change is broad, encompassing the whole organisation environment (discussed at the beginning of this section). In addition to the healthcare and administrative effects of the documentation system, we need to know how managers and trainers influenced the implementation of the system, how their views of the role and capability of the documentation system affected the implementation, which in turn could have affected the non-managerial staff's ability and willingness to use it. This multi-layered situation creates a state of affairs in which an understanding of organisational complexity and the hierarchical nature of the situation becomes important (Anderson et al. 2003; Begun et al. 2003; Maguire et al. 2006). The remainder of this section discusses a methodology based on the sociological technique, Institutional Ethnography that can account for this embedded complexity while reducing the risk of information overload.

Institutional ethnography (Campbell 1998, 2001, 2004; Smith 2001) is a sociological theory / method package that attempts to describe the social organisation of knowledge using a materialist empirical approach (Rankin 2008, p. 4). Its core ontological position is that social life can be understood as "ruling relations" that are organised through texts or text-mediated processes (DeVault and McCoy 2006). Clearly the focus of the present study on nursing documentation is well suited to this approach. Ruling relations refers to the embeddedness of individuals within hierarchies, which mediate their relationships within social life. Institutional ethnography has been used widely in research in the sociology of nursing (e.g. Campbell 2001; Rankin 2008; Vukic and Keddy

2002). There are also a small number of studies which use the approach in health informatics research (Moehr et al. 2001; Poland et al. 2005). As this approach takes account of the research subjects' embeddedness in social hierarchy, and how the hierarchy influences the change, it fits well with the complexity theory and processual approaches discussed previously. It provides a framework in which to understand the organisational change processes as having simultaneously bottom-up and top-down features as per the systems view of change management (Cao et al. 2004), and therefore is a good candidate methodology for the present study.

Data analysis for institutional ethnography research tends to be more flexible than those prescribed by grounded theory. Rather than the typical approach of coding data into emergent themes and using this to generate hypotheses and relationships, Institutional Ethnography takes a simpler approach to coding, tending to avoid this formal analytic strategy. Instead, parts of interview transcripts are indexed according to topic (DeVault and McCoy 2006, pps. 769-771). As a result, the substantial risks of information overload that are inherent in more immersive coding procedures are much reduced.

Once our interviews were transcribed, they were processed using a three stage coding procedure. First they were indexed by the topic (broadly based on the interview guide), the job title of the respondent (reflecting ruling relations), and the site. Second, each coded section of text was summarised in the researcher's own words (in order to reduce the effects of the highly variable way that different individuals express themselves). Finally, a summary of each interview topic was written in order to highlight the different views expressed by job title and location. This comparative approach provides us with the substance for our polyvocal narrative. It is important to note that the summaries were closely linked to the original unprocessed transcripts and audio files, so while the data were quite heavily processed, they remained connected to their original raw forms. Retaining information within content-based topics rather than less well defined themes keeps the research focused on the different processes that occur during the longitudinal study, and allows for a description of the process of change over time, clearly describing differences between the sites.

## PRELIMINARY FINDINGS FROM THE CASE STUDY

Two residential aged care facilities under the same management group, one regional and one rural, were the study sites for this investigation during the first half of 2009. Both were at approximately the same stage of implementing electronic nursing documentation when the research commenced, with training completed. However, staff at the regional site had not yet begun using the electronic documentation system, while the rural site staff had been using the system for exception reporting of progress notes for about one week. Twenty-six semi-structured interviews were conducted (14 in the regional site, and 12 in the rural site). The interviewer (the first author) spent two days at each site through the morning and afternoon shifts recruiting study participants and conducting interviews that lasted between 10 and 40 minutes. The longer interviews tended to be with managers, or with carers selected for "train the trainer" training, and/or more skilled computer users with sufficient information technology experience to allow them to discuss the introduction of the electronic documentation system more extensively.

A breakdown of the demographics of the research participants is given in Table 1. Note that sampling participants in "train the trainer" training was approximately equal in the regional and rural sites, but that only one member of staff at the rural site provided any training to the rest of the care team members (due in part to staff turnover, and in part as implementation occurred concurrently with accreditation which caused corresponding human resource shortages), while almost all of the trainers at the regional site did this. No urban site is available in our study sample. From discussion with those in the aged care industry, we would expect staff turnover and the proportion of care staff from non-English speaking backgrounds to be higher in urban sites, due to the low pay and difficult working conditions in residential aged care homes. Because the demographics of the regional and rural sites are very similar in terms of staff age, turnover and ethnicity, these details are not reported in this paper.

Table 1 Total number of interviews by job title at each site, and total number of interviewees who received "train the trainer" training at each site.

| Site | (Deputy) Managers | Low Care Manager | Registered Nurses | Enrolled Nurses | Recreation Officers | Personal Carers | Total |
|---|---|---|---|---|---|---|---|
| Total number of interviewees | | | | | | | |
| Regional | 2 | 1 | 2 | 1 | 1 | 7 | 14 |
| Rural | 1 | 1 | 2 | 1 | 1 | 6 | 12 |
| Number of interview subjects who attended "train the trainer" ( out of 10 total trained at each site) | | | | | | | |
| Regional | 1 | 0 | 0 | 1 | 0 | 2 | 4/10 |
| Rural | 1 | 1 | 1* | 0 | 0 | 2 | 5/10† |

*One registered nurse was a trainer for the same software product at the previous organisation she worked for.
† Only one personal care worker among this group ended up providing hands-on training.

Our comparative approach to coding helps highlight the different attitudes and experiences of floor staff and managers to the change from paper to electronic documentation. Because the documentation software was closely modelled on the pre-existing physical paper documentation, the floor staff tended to regard the differences between the paper and electronic systems, as simple (occasionally inconvenient but generally positive) differences in the way data entry was performed, and not a more fundamental difference in the *process* of documenting their care work. By contrast the managers were aware of a much greater potential for fundamental changes to their work due the improved retrievability of data in the documentation system, and ability to have the documentation system communicate directly with the software claiming funding from government.

The differences between training regimes at the two sites, with many peer trainers available at the regional site, and only one available at the rural site, suggests the action of a bottom-up effect in establishing high levels of staff awareness at the regional site, which was not present at the rural site. It's difficult to determine to what extent this difference was due to the differences in the availability of human *resources* at each site or staff capability (especially with computer skills and communication skills). Were these factors similar at both sites, but just more effectively utilised at the regional site? Did the inconvenient timing of "train the trainer" training at the rural site compound a pre-existing lack of human resources, or were the resources available but not utilised? Further research is required to answer this question, as the answer will reflect initial conditions as well as the subsequent outcomes.

The management's awareness of the potential benefits of improved flow of information seemed much lower at the rural site than the regional site, and this seemed to have a top down effect in that staff's awareness of the capability of the software in turn seemed limited. The rural site management seemed to have a less *strategic* view of how to introduce and encourage the adoption of the new system. Instead the rural site management were focused on immediate issues surrounding the implementation, while not considering the future possibliities of what could be achieved with the electronic system that could never have been achieved using the paper system.

Finding the explicit evidence for this is quite difficult, and perceiving improvements in the documentation process could easily be interpreted as a purely management-driven phenomenon, in that the most obvious statements about the improvements in capability of the electronic documentation system are from the management at both sites. While the regional site's manager acknowledged the improvements that the software brings to the funding application process, s/he then went on to discuss other features that the software provides, such as the ability to audit the quality of staff's documentation, and consequently being able to use this as an informal appraisal process, to help drive an improvement of the documentation of the site through leadership. By comparison, the interview extracts from the rural site do not go beyond the improved retrieveability of the documentation for funding purposes. Data about benefits of the electronic documentation system illustrate the combination of top down versus bottom up effects quite well – a representative comment from a personal care worker at the rural site that the benefits are for "the managers to flick up a resident['s notes], I think it will be great for them".

Detailed accounts of individual benefits of the electronic documentation system were not forthcoming at the rural site, while staff at all levels in the urban site had positive comments about benefits for them as individuals who use the electronic documentation system, particularly concerning the increased efficiency with filing, the potential for documentation to be more up to date, and more consistently formatted.

Assessing the initial conditions at each site provides us with a comprehensive assessment of the starting differences between the two sites. The differences between initial conditions manifest themselves as differences in training approach and resources, and the site management's strategic view of what can be achieved with the electronic system. We have performed follow-up interviews at 6 months post-implementation, yet to be fully analysed, and will conduct further interviews at 12 and 24 months post-implementation. This will allow us to track the consequences of these different initial conditions over time. Do the two sites eventually converge to a similar outcome, or do the big differences in initial conditions cause divergence of outcomes over time? Or to put it another way, how do the differing initial conditions affect the trajectory represented by the "classic change curve" in Figure 2 – do the two sites converge to a similar outcome, or does the difference in a starting point influence the trajectory towards a divergence over time?

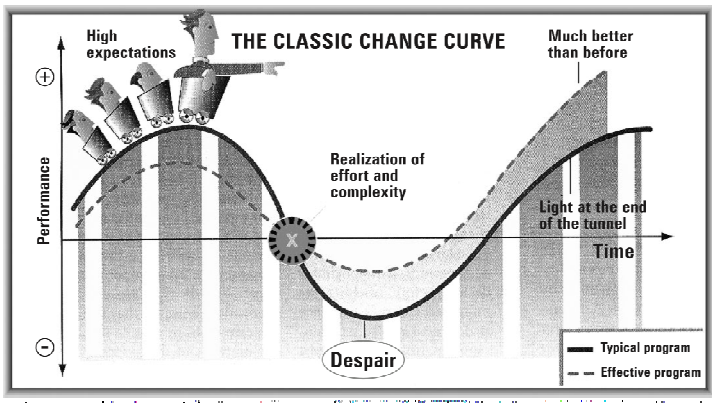


Figure 2 The classic change curve, reproduced from Elrod and Tippett (2002)

## CONCLUSION

This paper has reviewed previous approaches in the literature on researching organisational change both in nursing informatics, and more generally in health informatics. The existing literature in health informatics, organisational studies, and general social science has been brought together to find an appropriate methodology for investigating organisational change as observational rather than participant researchers, at the level of the whole organisation

Our findings relate to the processual view of organisational change in that our findings are influenced by analysis at all levels of the organisation – we examine the embeddedness of the change – "studying processes across a number of levels of analysis" (Pettigrew 1997) and we provide the framework for future examination of "temporal interconnectedness" (ibid). Our approach is also consistent with the complexity view of organisational change in that we are setting the frame to determine how non-linear causal relationships are influenced by interconnected by feedback loops which result in amplification, extinguishment or homeostasis (Maguire et.al 2006). This requires a holistic view as these interconnections can span different parts of the organisational structure. In turn, this is reflected by the hierarchical view taken by our analysis.

The processual view concerns the progress of change over time, wheras the focus of this paper is to discuss our approach supported by a case study examining the indital conditions. Consequently only a few finding have ben reported in this paper. However our results to date suggest that the approach is able to detect differences in initial conditions, which may have divergent influences on the future trajectory of the changes at the two study sites. These initial conditions can be seen as emergent properties – the whole of the situation in the organisation being greater than the sum of the parts, which initiates the process that begins the trajectory of change. The parameters of strategies, resources and processes interacting with the actors, together mediate a response sensitive to the different starting conditions within each study site. Our preliminary results suggest that we have devised a methodological strategy sensitive enough to detect the differences between the sites at the early stage of this research. We have a good strategy and approach for following the change processes in each organisation over a longitudinal study.

## REFERENCES

Alexander, G.L., Rantz, M., Flesner, M., Diekemper, M., and Siem, C. 2007. "Clinical Information Systems in Nursing Homes: An Evaluation of Initial Implementation Strategies", *Computers Informatics Nursing* (25:4), July/August, pp 189-197.

Ammenwerth, E., and de Keizer, N. 2005. "An Inventory of Evaluation Studies of Information Technology in Health Care - Trends in Evaluation Research 1982-2002", *Methods of Information in Medicine* (44:1), pp 44-56.

Ammenwerth, E., Kutscha, U., Kutscha, A., Mahler, C., Eichstädter, R., and Haux, R. 2001. "Nursing Process Documentation Systems in Clinical Routine–prerequisites and Experiences", *International Journal of Medical Informatics* (64:2-3), pp 187–200.

Ammenwerth, E., Iller, C., and Mansmann, U. 2003. "Can Evaluation Studies Benefit from Triangulation? A Case Study", *International Journal of Medical Informatics* (70:2-3), July, pp 237-248.

Anderson, R., Issel, L., and McDaniel Jr, R. 2003. "Nursing Homes as Complex Adaptive Systems: Relationship Between Management Practice and Resident Outcomes", *Nursing Research* (52:1), pp 12-21.

Barbour, R. 2001. "Checklists for Improving Rigour in Qualitative Research: A Case of the Tail Wagging the Dog?", *British Medical Journal* (322:7294), May, pp 1115-1117.

Begun, J.W., Zimmerman, B., and Dooley, K. 2003. "Advances in Health Care Organization Theory", in: *Advances in Health Care Organization Theory*, S. Mick and M. Wyttenbach (eds.). San Francisco: Jossey-Bass, pp 253-288.

Buchanan, D., and Dawson, P. 2007. "Discourse and Audience: Organizational Change as Multi-Story Process", *Journal of Management Studies* (44:5), pp 669–686.

Campbell, M.L. 1998. "Institutional Ethnography and Experience as Data", *Qualitative Sociology* (21:1), March, pp 55-73.

Campbell, M.L. 2001. "Textual Accounts, Ruling Action: The Intersection of Knowledge and Power in the Routine Conduct of Community Nursing Work", *Studies in Cultures, Organizations & Societies* (7:2), pp 231-250.

Campbell, M.L. 2004. *Mapping Social Relations: A Primer in Doing Institutional Ethnography*. AltaMira Press.

Cao, G., Clarke, S., and Lehaney, B. 2004. "The Need for a Systemic Approach to Change Management—A Case Study", *Systemic Practice and Action Research* (17:2), April, pp 103-126.

Collins, S.A. 2009. "Informatics Methods to Understand Interdisciplinary Communication Related to Common Goals in the Intensive Care Unit", PhD thesis, New York, N.Y, U.S.A: Colombia Univerity,

Dawson, P., and Buchanan, D. 2005. "The Way It Really Happened: Competing Narratives in the Political Process of Technological Change", *Human Relations* (58:7), pp 845-865.

DeVault, M., and McCoy, L. 2006. "Handbook of Interview Research: Context & Method", in: *Handbook of Interview Research: Context & Method*, J. Gubrium and J. Holstein (eds.). pp 751-776.

Diment, K., Yu, P., and Garrety, K. in press "Complex Adaptive Systems as a Model for Evaluating Organisational Change Caused by the Introduction of Health Information Systems", *electronic Journal of Health Informatics*.

Elrod, P.I., and Tippett, D.D. 2002. "The 'Death Valley' of Change", *Journal of Organizational Change Management* (15), June, pp 273-291.

Embi, P.J., Yackel, T.R., Logan, J.R., Bowen, J.L., Cooney, T.G., and Gorman, P.N. 2004. "Impacts of Computerized Physician Documentation in a Teaching Hospital: Perceptions of Faculty and Resident Physicians", *Journal of the American Medical Informatics Association: JAMIA* (11:4), August, pp 300-309.

Engesmo, J. 2008. "Managing Organisational Change and Technology", PhD Thesis. Norway: Norwegian University of Science and Technology,

Glaser, B.G., and Strauss, A.L. 1967. *The Discovery of Grounded Theory: Strategies for Qualitative Research*. Chicago: Aldine-Atherton.

Hendy, J., Fulop, N., Reeves, B.C., Hutchings, A., and Collin, S. 2007. "Implementing the NHS Information Technology Programme: Qualitative Study of Progress in Acute Trusts", *British Medical Journal* (334:7608), 2007, pp 1360-1364A.

Irurita, V. 1996. "Hidden Dimensions Revealed: Progressive Grounded Theory Study of Quality Care in the Hospital", *Qualitative Health Research* (6:3), 1996, pp 331-345.

Jones, M., and Diment, K. 2010. "The CAQDA Paradox: the divergence between research method and analytical tool". Computer-Aided Qualitative Research Conference Asia, Kuala Lumpur, Malaysia.

Kaplan, B. 1997. "Addressing Organizational Issues into the Evaluation of Medical Systems", *Journal of the American Medical Infomatics Association* (4), pp 94-101.

Kaplan, B. 2001. "Evaluating Informatics Applications—some Alternative Approaches: Theory, Social Interactionism, and Call for Methodological Pluralism", *International Journal of Medical Informatics* (64:1), pp 39–56.

Lorenzi, N.M., and Riley, R.T. 1995. *Organizational Aspects of Health Informatics*. New York: Springer-Verlag.

Maguire, S., McKelvey, B., Mirabeau, L., and Oztas, N. 2006. "Complexity science and organization studies", in: *The Sage Handbook of Organization Studies, 2nd edn. Thousand Oaks, CA: Sage*, S. Clegg, C. Hardy, W. Nord and T. Lawrence (eds.). pp 164-214.

Manis, J., and Meltzer, J.G. 1972. *Symbolic Interaction: A Reader in Social Psychology*, (2nd ed.). Boston, Mass: Allyn and Bacon.

Miles, M.B. 1979. "Qualitative Data as an Attractive Nuisance: The Problem of Analysis", *Administrative Science Quarterly* (24), December, pp 590–601.

Miles, R.E., Snow, C.C., Meyer, A.D., and Coleman Jr, H.J. 1978. "Organizational Strategy, Structure, and Process", *Academy of Management Review* (3:3), pp 546–562.

Moehr, J.R., Berenji, G.R., Green, C.J., and Kagolovsky, Y. 2001. "Project-Based Teaching in Health Informatics: A Course on Health Care Quality Improvement", *Studies in Health Technology and Informatics* (84:2), pp 1061-1065.

Nelson, E.C., Batalden, P.B., and Godfrey, M.M. 2007. *Quality by Design: A Clinical Microsystems Approach*. Jossey-Bass Inc.

Pettigrew, A. M. 1997. "What is a processual analysis", *Scandinavian Journal of Management* (13:4), pp. 337–348.

Poland, B., P. Lehoux, D. Holmes, and G. Andrews. 2005. "How Place Matters: Unpacking Technology and Power in Health and Social Care", *Health & Social Care in the Community* (13:2), pp 170-180.

Rankin, J.M. 2008. "How Nurses Practice Health Care Reform: An Institutional Ethnography", PhD Thesis, Canada: University of British Colombia,

Rikli, J., Huizinga, B., Schafer, D., Atwater, A., Coker, K., and Sikora, C. 2009. "Implementation of an Electronic Documentation System Using Microsystem and Quality Improvement Concepts", *Advances in Neonatal Care: Official Journal of the National Association of Neonatal Nurses* (9:2), April, pp 53-60.

Seale, P.C. 2004. *Researching Society and Culture*. SAGE Publications.

Smith, D.E. 2001. "Texts and the Ontology of Organizations and Institutions", *Studies in Cultures, Organizations & Societies* (7:2), pp 159-198.

Staggers, N., and Parks, P.L. 1993. "Description and Initial Applications of the Staggers & Parks Nurse-Computer Interaction Framework", *Computers in Nursing* (11:6), pp 282-290.

Swinderman, T. 2005. "The Magnetic Appeal of Nurse Informaticians: Caring Attractor for Emergence", PhD Thesis. Florida Atlantic University,

Upperman, J.S., Staley, P., Friend, K., Benes, J., Dailey, J., Neches, W., and Wiener, E.S. 2005. "The Introduction of Computerized Physician Order Entry and Change Management in a Tertiary Pediatric Hospital", *Pediatrics* (116:5), pp e634-e642.

Van de Ven, A.H., and Poole, M.S. 2005. "Alternative Approaches for Studying Organizational Change", *Organization Studies* (26:9), September, pp 1377-1404.

Vukic, A., and Keddy, B. 2002. "Northern Nursing Practice in a Primary Health Care Setting", *Journal of Advanced Nursing* (40:5), pp 542–548.

Whittaker, A.A., Aufdenkamp, M., and Tinley, S. 2009. "Barriers and Facilitators to Electronic Documentation in a Rural Hospital", *Journal of Nursing Scholarship* (41:3), pp 293-300.

Yu, S., Gandhidasan, S., and Miller, A. 2010. "Different Usage of the Same Oncology Information System in Two Hospitals in Sydney--Lessons Go Beyond the Initial Introduction", *International Journal of Medical Informatics* (79:6), pp 422-429.

ACKNOWLEDGEMENTS

This research is funded by the ARC linkage grant held by Dr Ping Yu: "Introducing computer-based nursing documentation into residential aged care: A multi-method evaluation of success".

## COPYRIGHT

Kieren Diment, Ping Yu and Karin Garrety © 2010. The authors assign to ACIS and educational and non-profit institutions a non-exclusive licence to use this document for personal use and in courses of instruction provided that the article is used in full and this copyright statement is reproduced. The authors also grant a non-exclusive licence to ACIS to publish this document in full in the Conference Papers and Proceedings. Those documents may be published on the World Wide Web, CD-ROM, in printed form, and on mirror sites on the World Wide Web. Any other usage is prohibited without the express permission of the authors.