Delivering Optimal Health Outcomes: Making Sense Of A Business Intelligence Decision In A Notfor-Profit Organisation

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Abstract

In this paper, the researcher reports on an empirical qualitative case study which investigated the extant information systems (IS) in a not-for-profit (NFP) healthcare delivery organisation in Australia. The researcher was exploring the readiness of the organisation for business intelligence (BI) initiatives prior to a decision on the BI project proceeding or otherwise. Shortly after the completion of the case study, the executive managers of the organisation reached an unforeseen negative decision regarding the BI project although BI remains a strategic objective. The sense-making processes associated with the decision are discussed in this paper with sense making as the over-arching conceptual framework. The study found that, despite some support for BI at the individual level, corporate memory of a recent failed IT project and lack of a committed business sponsor at the organisational level meant that in the quest for meaning, the decision makers had reverted to past patterns of sense making to reject the BI project. The contributions of the study are derived from utilising sense-making concepts with an industry readiness methodology. This paper should be of value to both academics and practitioners worldwide as they work with organisations especially in the NFP sector that are considering embarking on complex and innovative BI projects.

Keywords: Healthcare ICT, Business Intelligence, Sense Making, Not for Profit.
1 INTRODUCTION

Information systems (IS) are the backbone of most organisations today, ranging from modest off-the-shelf word processing, spreadsheet and database tools to more sophisticated systems such as enterprise-wide business intelligence (BI) applications which are improving the way organisational performance is monitored, managed and reported. While the term BI is recent, the concept is much older, having its roots in the decision support systems (DSS) literature of the 1970s. BI applications have become a top spending priority of technology-intensive organisations, with the acknowledgement that businesses need to address how decisions are made and executed, and how they can be improved and supported (Davenport 2010).

This paper draws on literature on sense making, a topic brought to prominence by Weick (1993). Weick (1993) explains how sense making is often used to form routines, establish patterns of thinking and is often applied to situations where explanations are not readily available. Sense making is argued to be a process of judgement where an actor will create a perception and believe in it because the situation at hand needs meaning attached to it. The sense-making theme is interdisciplinary. While commonly used in management and organisational studies over the past decade, it is less widespread in the IS literature (Weick 2007). This paper discusses the results of an investigation into the readiness of an NFP aero-medical delivery organisation to implement a BI project. In order to understand the unforeseen decision not to proceed with the project, a sense-making perspective has been adopted by the researcher, based primarily on the work of Cecez-Kecmanovic, Jap and Bunker (2008) which examines sense making at four levels, namely, extra-subjective level (cultural), inter-subjective level (social), intra-subjective level (individual), and generic-subjective level (organisational).

The not-for-profit (NFP) organisation of the case study is Australian Aero Medical Healthcare (AAMH) - a pseudonym. AAMH is in the business of aero-medical retrievals, delivering 24-hour emergency services as well as everyday primary healthcare to remote and regional communities of Australia. The AAMH Strategic Plan 2011-2015 was in draft form but key pillars included: 1) maintaining the position of AAMH as a main player in aero-medical and healthcare services; 2) providing effective and efficient service delivery to remote and regional Australia; and 3) creating an organisational model that is responsive to change. In order to achieve these essential goals, BI is listed as a strategic objective.

Few studies have investigated the espousal of BI initiatives in healthcare organisations. This paper aims to address the lack of research in the field and takes a socio-technical perspective. The objectives of the paper are twofold: firstly, to deconstruct the essence of the AAMH case study by applying a sense-making framework in order to make sense of the decision by the company executives regarding the BI project; and secondly, to expand the sense-making conceptual framework into the NFP sector, allowing for its unique characteristics. The paper takes the form: an overview of the relevant literature, an explanation of the theoretical framework, an outline for the research strategy including a description of the research site, followed by excerpts from interviews illustrating pertinent concepts, a discussion of the findings including theoretical and practical contributions, and, in concluding remarks, an account of the limitations of the study and opportunities for future research.

2 BACKGROUND OF THE STUDY

In this section of the paper, the researcher reviews the literature within the broad research domains of the study: business intelligence (BI), BI readiness models, and healthcare ICT, leading to the theoretical review section for a discussion of sense-making conceptual frameworks.
2.1 Review of the literature

The scholarly literature contains numerous definitions of business intelligence (BI). Watson (2009, p.491) defines BI as “… a broad category of applications, technologies and processes for gathering, storing, accessing, and analysing data to help business users make better decisions”. To expand on notions of decision making, the researcher agrees with Shollo and Kautz (2010 abstract) whereby BI also involves “data, information, knowledge, decision making” besides the supporting products, processes and technologies for making decisions based on intelligence. Mintzberg, Raisinghani and Théorêt (1976, p.246) define a decision process as “a set of actions and dynamic factors that begin with the identification of a stimulus for action and ends with the specific commitment”. This is fitting as the decision-making processes played out by the executives of AAMH and the readiness of the organisation for BI were investigated.

Few studies have investigated the readiness of healthcare organisations to espouse BI initiatives. Academic literature on readiness methodologies in BI focus on implementation aspects of BI and are rare in the NFP setting. For example, Arnott (2008) and Hawking and Sellitto (2010) report on BI organisational critical success factors (CSF) while Sharma, Reynolds, Scheepers, Seddon and Shanks (2010) and Shanks and Sharma (2011) propose a theoretical model to represent the relationship between business analytics and organisational actions to improve performance gains and competitive advantage.

There are several industry readiness models, such as The Data Warehousing Institute (TDWI) guide by Eckerson (2007) and a BI assessment framework by deHenry (2007). deHenry (2007) provides clear qualitative guidelines to describe the readiness of an organisation for BI: these are identified as functioning IT/business partnerships, a current analytic culture, and most importantly, a capable and astute business management sponsor.

This paper takes the position that, whereas healthcare ICT focuses on healthcare and technology, BI incorporates additional organisational information. For example, the linking of electronic health data with financial and/or human resources (HR) data has the capacity to improve the decision-making capabilities of both clinicians and management. In the healthcare literature, Häyrinen, Saranto and Nykänen (2008, p.293) define an electronic health record (EHR) or electronic medical record (EMR) as a repository of “patient data in digital form, stored and exchanged securely, and accessible by multiple authorized users. It contains retrospective, concurrent, and prospective information and its primary purpose is to support continuing, efficient and quality integrated healthcare”. In this paper, the terms EHR and EMR are used interchangeably.

Quality data is essential. Häyrinen et al. (2008, p.300) warns, “it is important that all healthcare professionals who provide information record it themselves” otherwise accuracy of documentation suffers. There is a tendency for busy clinicians to rely on pre-existing patient notes on standardized templates instead of initiating creative clinical thinking. A blindly-accepted diagnosis is detrimental to optimum patient outcomes for the reason that an EHR can become a powerful vehicle for perpetuating erroneous information leading to diagnostic errors when transmitted electronically (Hartzband & Groopman 2008). In studying the success of EHR systems, Häyrinen et al. (2008) found that the needs of all healthcare professionals, as well as consumers, including patients, should be taken into account in the future development of healthcare systems. This suggests that the usefulness of EHR to clinicians as decision support tools is in doubt and is compounded by the fact that data collection processes may be flawed and data quality may be unreliable. It is at this point the conceptual framework of the study is explained.

2.2 Theoretical framework

There are many contexts for sense making: sense making and organisational strategising; sense making and organisational knowing; sense making and knowledge management; sense making for understanding users; sense making and individuals, sense making and technology, and sense making
and health communications, to list a few. Shollo and Kautz (2010) claim most BI studies are technocentric. In this paper, decision-making processes in BI are explored from a comprehensive socio-technical perspective such as sense making. The sense-making view is a conceptual base from which to analyse qualitative interview data exposing the perceptions of the decision makers of AAMH concerning existing healthcare IS, and their individual and collective assessments of BI in healthcare.

Sense making may be a set of assumptions, a theoretic perspective, or a methodological approach (Dervin 2003). The theoretic perspective was adopted, using relevant concepts in a sensitising mode as an analytical lens. Sense making, as explained by Weick (1995), is the process by which people reduce the complexity of their environment to a level they can understand and is the process by which people as human actors give meaning to experiences. Sense making differs from interpretation since sense making applies at an earlier more tentative stage than interpretation. People draw from their experiences to use what they know for interpreting problematic situations that are ambiguous, uncertain and make no sense. In doing so, they seek and exchange information, ascribe meanings, interpret and explain situations, to determine the required action (Weick 1995). While courses of actions imply the making of decisions, a decision is actually based on locating, articulating and ratifying an earlier determination, being “an act of interpretation rather than an act of choice” (Weick 1995, p.185). Feldman (1989; cited in Weick 1995, p.5) insists that sense making does not necessarily result in action, claiming that it “may result in an understanding that action should not be taken or that a better understanding of the event or situation is needed”.

Through sense making, people give meaning to the events and actions of an organisation. Choo (1996, abstract) claims that people use “information strategically in three ways: to make sense of changes in the environment; to create new knowledge for innovation; and to make decisions about courses of action”. These three ways interweave a rich explanation of organisational information use. On the other hand, Du Toit (2003, p.28) claims that while sense making brings shared objectives and activities to an organisation, prevailing sense-making systems can act as filters which actually prevent new knowledge being embraced and past knowledge being adapted.

Sense making is not necessarily about truth and getting it right since sense making is driven by plausibility rather than accuracy (Weick 1995). Weick, Sutcliffe and Obstfeld (2005, p.141) assert it is about “continued redrafting of an emerging story so that it becomes more comprehensive ...”. Weick (1995, p.61) remarks “... an obsession with accuracy seems fruitless, and not of much practical help, either”. Certainly, studies assessing the accuracy of managers’ decisions are rare and when they are done, suggest that perceptions of managers are highly inaccurate (Weick, 1995, p.55; Weick, Sutcliffe & Obstfeld 2005, p.147).

Along with sense making at organisational levels, Weick (1995, p.6) notes the occurrence of sense making in both individual and social activities. Dervin (1998; 2003) investigated individual sense making during human-computer interactions in the context of understanding the practices of users for information design. Dervin’s theory of sense making, in particular concepts of cognitive situations, and metaphorical ‘gaps’ and ‘bridges’ are loosely applied as sensitising devices in the study to analyse the interview data of participants in the AAMH study.

Sense making is used to explain the retrospective nature of implying causality to a complex situation through cognitive framing and judgement (Kaplan 2008). Technologies are social artefacts since their material form and function embody the assumptions and knowledge of the designers, builders and users of those technologies (Orlikowski & Gash 1994). Orlikowski and Gash (1994) draw on various concepts such as interpretative schemes from structuration theory (Giddens 1984) in order to develop the notion of technological frames; a frame being the basis upon which actors organise their experiences in order to explain them effectively (Goffman 1974, p.30). Orlikowski and Gash (1994, p.175) allege that technological frames assist actors “to interact with technology ... to make sense of it ... which then serves to shape subsequent actions towards it”, The concept of technological frames is used in the analysis section of this paper.
Cecez-Kecmanovic, Jap and Bunker (2008) contribute to the strategy-in-practice theoretical perspective by an analysis of individual, collective and organisational sense making by building on earlier studies (Cecez-Kecmanovic & Jerram 2002; Cecez-Kecmanovic 2004) to propose a sense-making model of knowledge management in organisations. Cecez-Kecmanovic et al. (2008) assert it is useful to distinguish the characteristics of four types of sense making: these are the inter-subjective level (social), extra-subjective level (cultural), intra-subjective level (individual), and generic-subjective level (organisational). These levels of sense making are applied as a meta-theory in the paper as the practice perspective is advanced.

In the industry literature on sense making, Klein, Moon and Hoffman (2006, p.70) state that “sense making has become an umbrella term for efforts at building intelligent systems”. Klein et al. (2006) examine sense making from various perspectives. One is psychological which includes creativity, curiosity, comprehension, mental modelling, situation awareness, and decision making. They determine that sense making is a motivated continuous effort to understand the connections between people, places and events in order to anticipate future actions. Klein et al. (2006, p.72) resolve that sense making does not always have “clear beginning and ending points and the simplified waterfall model of cognition runs counter to empirical evidence about expert decision making”.

Sense-making theory has been used to illuminate healthcare ICT phenomena. For instance, in a Danish healthcare setting, Jensen, Kjærgaard and Svejvig (2009) conducted an empirical study of the implementation of an EMR system using institutional theory as a macro-theory and sense making for individual interpretations to provide strong evidence of human agency as clinicians enact work practices and shape the use of the EMR. From the discussions of literature and theory above, the research problem of the paper has been constructed, this being “explain how sense making influences decision making in the context of healthcare business intelligence in the not-for-profit sector”.

3 RESEARCH STRATEGY

Sense-making builds on the assumption that reality is socially constructed (Cecez-Kecmanovic 2004, p.157). Hence it is appropriate that the research approach of the study was interpretive since interpretivists consider that there are multiple realities corresponding to the perceptions of human actors. This is underscored in a query by Weick (1995, p.75) “… how does action become coordinated in the world of multiple realities?”. For the study, the human actors trying to make sense of the situation were both the study participants and the researcher.

3.1 Research site

Australian Aero Medical Healthcare (AAMH) was selected as the case for the study. The mission of AAMH is to provide excellence in aero-medical and primary healthcare to regional and remote communities across Australia. AAMH owns a fleet of 61 fully instrumented aircraft with the very latest in navigation technology, operating from 21 AAMH bases across Australia, and flight doctors and nurses responsible for the care of over 270,000 patients. AAMH is a not-for-profit organisation, supported by Commonwealth, State and Territory government grants, community and corporation donations, and legions of loyal volunteers. Organisationally, AAMH consists of seven legal entities, of which the Queensland section is one. Alongside a reputation for corporate responsibility and a strong commitment to excellence, AAMH has shown a willingness to pursue the latest in technology as demonstrated by the constant upgrading of the aircraft fleet (MacKrell, Houghton & Campbell 2011).

3.2 Information systems in situ

The Health Information Management section of AAMH has been established for five years. Its main role is managing Health and Aviation Logistics (HAL), the most important operational IS in AAMH. HAL is a data collection tool, containing activity data used for compliance and other reporting to
funders such as Queensland Health and Australian Government Department of Health and Aging (DOHA). The data collected relates to various services such as primary healthcare (mental health, allied health) and aero-medical retrievals. Examples of data are the number of patients seen at a clinic, which communities have been serviced, who is providing the service such as a doctor or nurse, inter-hospital transfers, movement of patients, aircraft flying hours, number of landings, flight and duty times. The data is captured in various paper forms from clinics and flights. Forms, most of which are completed on flights by clinicians, are taken back to bases, patients are de-identified, diagnostic codes are inserted, and administration staff then enters the data into HAL. Some unstructured data such as clinical documentation is free text and not entered into HAL but filed in paper form.

HAL was written specifically in Microsoft SQL 2000 for AAMH by a vendor. It has a complex structure with up to 96 tables although the data contained within is not large. Enhancements have been made to HAL, for instance, a data repository written in SQL 2008 R2 which is described as a data warehouse by the users.

Crystal Reports is one reporting tool used to extract data which is then entered into Excel for formatting as graphs and reports. Another important medical IS is MD3. It is an off-the-shelf application containing GP medical records. MD3 was rolled out across all Queensland AAMH bases when the recent highly anticipated EMR project failed to materialise. Other IS are human resources (Chris21) and finance (Finance 1), neither of which links with HAL at this stage.

3.3 Design and methodology

The empirical qualitative case study consisted of a single case with the intention of exploring AAMH’s readiness for BI. Case study research is recognised as an empirical inquiry investigating a contemporary phenomenon within a real-life context when the boundaries are imprecise (Yin 1994). These facts hold true for the study in that very little prior research (if any) had taken place. As an example, the researcher initially had no knowledge of the IS deployed in AAMH. Gradually over the course of interviews, the situation emerged.

A comprehensive research log was compiled as interview data was gathered. As noted by Yin (1994, p. 80), interviews are subject to common problems of prejudice, poor recall and articulation. As well, the log allowed for inherent biases of the researcher to be documented for purposes of authenticity and plausibility (Pozzebon 2004). Authenticity addresses the conduct of field work and is associated with the Klein and Myers (1999) principle of suspicion which requires the researcher to assume a critical perspective by not taking the comments of participants at face value. Plausibility addresses the writing-up phase and is associated with the Klein and Myers (1999) principle of dialogical reasoning which encourages the researcher to look for possible biases in interpretation. To counter misinterpretations, especially by the researcher, an independent BI project manager was interviewed to respond to some of the statements made by study participants.

Early investigative work began in late 2009 at an informal meeting with the chair of the AAMH Queensland board in order to obtain approval of both the board and the CEO of AAMH Queensland section. This was essential before seeking ethics approval to conduct the study. Ethics approval was granted in April 2010 and extended to December 2011. Initially, “snowball” sampling (Patton 2002) was the main mechanism for selecting study participants. As the study progressed, the researcher was more attuned to sourcing knowledgeable potential interviewees. In all, 12 formal interviews were conducted with 11 study participants plus four informal interviews (two with the chair of the board and two with the CEO) over a two-year period. Pseudonyms are used in this paper. Please see Appendix A for a summary of study participants.

Interview guides to steer the interviews had been prepared in advance with topics drawn from the literature. The interviews in the first round were quite general and covered a broad range of subjects such as sustainability initiatives and business/IT alignment. The interviews in the second round concentrated on the perceptions of the interviewees regarding the feasibility of a BI project. The
interviews were semi-structured, conducted face-to-face, in-depth, and were of 30 to 75 minutes duration. Interviews were conducted in several locations: board room, staff room, interview room and in one case, nearby in a very noisy coffee shop. With the permission of the interviewees, interviews were audio recorded for the purpose of accuracy. The first round of interviews was transcribed from audio tape to Microsoft Word by a competent third person while the second round of interviews was outsourced to a reputable online transcription services. The interviews were supported by a limited number of company documents. For example, in the interview transcripts mention is made several times of the BI Road Map. This document was made available to the researcher.

Data analysis was manual rather than computer-assisted since the number of interviews was small. Codes used in the analysis were provisional and descriptive, being a short phrase or word related to concepts or themes drawn from the literature and/or theoretical framework to filter the interview data (Saldana 2009). This was a cyclical task with several iterations. Preliminary findings revealed the need to consider additional themes from the sense making literature. In the following section, excerpts from the interviews illustrate certain recurring concepts or themes.

4 ILLUSTRATIONS FROM THE CASE

Sense making is used both by researcher as the decision-making processes leading to a verdict on the BI project was analysed and by study participants, especially executive managers, as they tried to create meaning from the surrounding events. Cecez-Kecmanovic and Jerram (2002), Cecez-Kecmanovic (2004) and Cecez-Kecmanovic et al. (2008) developed a comprehensive conceptual framework of sense making for strategy-in-practice, requiring engagement at all levels: cultural, social, individual and organisational. This framework is useful for the study at a meta-theoretical level within which other theories such as technological frames (Orlikowski & Gash, 1994) and human-computer interaction (Dervin, 1998; 2003) are used.

4.1 Cultural level

The cultural aspect of sense making, also termed extra-subjective sense making (Wiley, 1994, p.158), is described by Cecez-Kecmanovic et al. (2008, p.4) as an “abstract idealised organising framework transmitted through social interaction, common experiences and socialisation of organisational members ... to provide a reservoir of background knowledge ...”.

AAMH had undergone an extensive transformation in order to compete successfully in a business environment that was becoming more aggressive and more commercial, one that offered few concessions and protections despite AAMH’s iconic status as a charity. As Roslyn, the HR Manager observed:

... while we are not-for-profit, we are working in a very competitive environment and we need to be competitive ... looking at the business strategically and looking at it as a competitive environment has really helped to change the philosophy around - we really are a not-for-profit but we are in a competitive for-profit environment.

Researcher: ... and the culture within the organisation is changing?

Roslyn: Yes. It’s becoming much more business-focussed, much more like a for-profit organisation.

MacKrell et al. (2011) found that NFPs have a distinct organisational culture with a tendency to dismiss considerable achievements claiming that the organisation is ‘just a not-for-profit’. Although AAMH is a large NFP and performing well, it was competing for tenders in a tough business environment. This harsh commercial reality was acknowledged by Samuel, General Manager Health Services:
... it's becoming a more competitive environment, both from an aero-medical and a primary healthcare perspective. We are competing with commercial entities in that space ... so any BI that I can get – that I can use to understand where we're not tracking well and fix it from an operational perspective, or any information that shows how effective it is, is gold, it's invaluable.

Being a NFP, AAMH remained heavily reliant on government funding and the generosity of donors with resultant accountability. This was noted by Gordon, Chief Financial Officer:

We've got our challenges in terms of various compliance issues that we need to meet - not only within the aviation industry but also within the health industry and from a financial and governance point of view.

A long history of IT outsourcing to XData, a company specialising in managed IT services, meant that in-house technical skills and a sense of IT ownership were lacking. Neil, recently appointed ICT Manager acknowledged “so literally within AAMH Queensland, we've only really been guided by XData ... we are reviewing Xdata’s role at the moment”. Jon, the independent IT consultant contracted to AAMH, revealed “... there's a team of XData people that work at the base. Now, Neil was pushing to bring that all in-house and the last I heard I think that it got killed, because it didn't get a lot of support ...”. The NFP culture at AAMH persisted in hindering an investment in IT resources despite evidence pointing to demand.

In summary, the survival of AAMH was at stake. In trying to make sense of recent forays into the business arena to compete for government funds through tenders, the executives of AAMH recognised there was no latitude for complacency and hiding behind the NFP banner as in the past. Bringing IT resources in-house would assist AAMH to demonstrate more effective and efficient practices through performance reporting, that is, compliance and ad hoc reports to funders and other stakeholders.

4.2 Social level

The social activities of sense making, also termed inter-subjective sense making (Wiley, 1994, p.154), are described by Cecez-Kecmanovic et al. (2008, p.4) as social interactions by human actors who "co-create shared, collective meanings of events and situations, based on which they may take joint or coordinated actions". In this paper, sense is made of human interactions with technology through the notion of technological frames (Orlikowski & Gash 1994, p.179). Goldkuhl (1981) and Goldkuhl and Lyytinen (1982, p.3) identified IS as social artefacts, being “social systems only technically implemented” as well as “formal linguistic systems for communication between people”. Objectives, values, and interests of stakeholders, particularly developers and users, are embedded in technological artefacts.

HAL was described as the most important operational IS at AAMH. It was not helpful that HAL remained a mystery to those in AAMH associated with it since its development and implementation were outsourced to a vendor whose communication with AAMH was sketchy. Jon, the experienced IT consultant, admitted “... there’s one guy on the planet that actually really knows how it works”. This was a serious constraint resulting in a trial and error approach to HAL’s enhancements. The outcome of one enhancement, the extraction of patient transport data into a data warehouse, led to extensive problems with user permissions and the generation of ‘rubbish data’.

A lack of familiarity with HAL’s inner workings led Neil, ICT Manager and a recent appointment, to devise solutions based on his prior experience with other organisations. As he said,

I revert back to [Neil’s previous employer] because it was quite interesting. Before that, we’d just pull out stats and go okay, then, there’s so many cars going across the Gateway Bridge and that’s what they would cost. Then they got the BI tool ... what if we close off several lanes.

This is not so surprising. Weick (1979; cited in Orlikowski & Gash 1994, p.191) claims:
People tend to approach the new in terms of the old. The same can be said of people confronted with new technology. In the absence of other information, they will attempt to interpret it in terms of their existing technological frames, imposing assumptions, knowledge, and expectations about a familiar technology on the unfamiliar one.

Hence in a typical sense-making response, when crisis struck, Neil relied on past patterns which, while safe, may have the effect of limiting the innovativeness of a BI solution. On the constructive side, Neil’s view of BI was holistic in that “when it comes to BI, if you just pull the BI out of health, you’re missing your HR side and you’re missing your finance side”. With insight, Neil recognised “… the one area that we don’t have any real collaboration and probably direction is the business solution’s side”.

In summary, sense-making activities associated with IS as social systems had mixed consequences. The tendency to rely on past experiences may be comforting however reverting to established patterns for solving problems could prove to be a barrier hindering the realisation of novel solutions. As well, without adequate communication and collaboration concerning the technology, HAL’s stakeholders, especially those seeking to launch BI tools, were disadvantaged.

4.3 Individual level

An individual has “thoughts, beliefs, feelings, desires, intentions, knowledge, skills, etc that determine how he or she makes sense” (Cecez-Kecmanovic et al. 2008, p.4). This level of sense making is called intra-subjective as “meaning is within the self” (Wiley 1994, p.154).

The individual and often divergent views of the executive managers in the study were apparent and central to the decision-making process. Many of the AAMH managers had experience outside the NFP setting and this knowledge contributed to shaping their views on BI in AAMH and many other issues. The individuality of stances on BI echoed the views of Pinch and Bijker (1987) who argued that different actors have different interpretations of a technological artefact based on interactions with it, and is exemplified when Barry, the Aviation Manager, explained “… if there were 12 people in a room, there were 12 different opinions of what actually this thing [EHR software] was going to do”.

This is where sense-making concepts put forward by Dervin (1998; 2003) are useful in evaluating the state of affairs: to describe the situation where disparities exist, to link opposing views of the situation using a ‘bridge’, and to state an outcome to the state of affairs. Gordon, Chief Financial Officer was not optimistic about the current crop of BI tools. From his perspective and with a memory of the recent EHR project failure, he described the situation and his solution for ‘bridging the gap’:

... I don’t think a prototype is out there to be quite honest and that’s the problem with the technology because it hasn’t matured. So I think we’re going to go through a phase in terms of having these separate databases doing these separate things until there is some technology out there that can take an overarching look or be able to pull data from here, here and here.

Tam, the successful BI project manager who was interviewed after the AAMH interview rounds had been completed, had a contradictory response:

I personally don’t think that the technology is immature. It’s been around for over 10 years now. All organisations have a lot of corporate data, so they have their HAL and their finance systems and their HR systems. But to turn that data into information, you need something like BI.

The concerns for Barry, Aviation Manager, were about NOT trusting HAL and using yet another parallel system as a work-around to solve perceived and real problems with HAL:

It’s my view, but we do a lot of double handling. I know we do double handling within our own department, because we don’t trust HAL. We use HAL for flight records, but because HAL had so many problems in the early days and spurious things were coming out of it, the
aviation department instituted a backup system for the flight and duty records and still using it to this day. So, we’re still using two systems at the same time.

Jon, the IT consultant, was forth-right in assessing the situation and put forwarded a solution, “I’d get SharePoint into the cloud, and then I’d focus on the things that are actually core business systems, which is obviously an HR system, a finance system and HAL”. Sally, Senior Manager of Health Informatics, came closest to selecting a BI solution for bridging the gap, “well, the thing is that none of our systems link ... we need to have a great BI that’s easy to use”. Sally felt anything was an improvement on the extant situation which was very wasteful of resources:

*We’ve got a report in HAL that we got built because it’s quite complex. It's pulling patient information, aviation information, and there's some complex linkages in the back of the system. We got the vendor to create this report. [Senior Health Information Manager] pulls it [data] out and puts it in Excel. We have to go and clean it all up because all the formatting is crap. Then, we actually have to clean the data because what happens is there's an aviation record. Every month, we send validations back to the bases and go, can you please fix it up? It usually takes a good week or so...*

Besides Sally, who worked closely with HAL data, several managers commented about the poor quality of the data entered into HAL, assuming that BI would improve data quality outcomes. Tam, BI Project Manager, responded with an instance of data management stewardship from his workplace during the implementation of BI, “we gave each business area ownership of their own data, it's an ongoing process to cleanse that data and make people aware so over time, you have that accountability and that visibility about the issues and you're constantly working to improve them ...”.

In summary, the situation at AAMH with diverse non-linked IS was uniformly recognised as challenging but there was lack of consensus on BI being the solution. This pointed to an unclear resolution of the BI initiative although independent preliminary advice suggested BI would be advantageous for AAMH.

### 4.4 Organisational level

In any organisation, there are “common generic meanings related to institutional roles, norms and rules ... decision-making processes ... and the like” (Cecez-Kecmanovic et al. 2008, p.4). At the organisational sense-making level, selves are left behind and meanings are synthesised into generic meanings through social interaction (Wiley 1994, p.258).

Neil, ICT Manager, recognised that the current IT situation was not ideal. He was hopeful that improvements would be instigated since BI was on the agenda as an organisational strategic objective, “… the systems themselves are still very disparate. They’re all over the place, so we identified – well, through strategic planning, even as early as last year, that there should be an information management program of work”. This remark by Neil was endorsed by TAM, the BI Project Manager. Tam stated categorically, “if you don't have good data management, you're not going to have good information management and you can't make decisions off it”.

While Neil, a recent arrival, advocated advanced IT solutions, some long-term executive managers had a collective memory of a recent failed EMR project. This was described by Samuel, General Manager of Health Services:

*... it was an off the shelf product which was - at the end of the day, all the things we wanted it to do, the off the shelf product was only about 20 per cent of the system. The rest of it was bespoke. It just was never going to work and the program failed.*

In summary, organisational memory of a failed EMR project was hindering the decision to initiate a BI project although BI was recognised as important and remained on the strategic agenda.
5 DISCUSSION OF THE FINDINGS

As an organisation, AAMH were entering an uncertain but dynamic business phase with an awareness of the imperative to successfully promote the high quality and sustainability of their aero-medical and primary healthcare services. The decision to implement a BI project would enable this to happen through more efficient processes and more effective reporting to funding bodies and other stakeholders.

In the case of AAMH, the information presented to the researcher by organisational managers despite multiple and sometimes competing agendas constituted a compelling business case for deciding to initiate a BI project. What happened in practice is supported by the sense-making literature. Du Toit (2003, p.28) emphasises that the sense-making view makes clear that individual actors have distinct views of what is happening in their workplace and multiple interpretations of what constitutes knowledge in organisations. Nevertheless, as Du Toit (2003, p.28) argues, interests of group harmony can compromise the ability of a group from adapting to changing circumstances.

Kaplan (2001) explains that achieving organisational focus is often more difficult for non-profits where agreement is generally reached harmoniously through consensus rather than by more autocratic decision-making means. NFP companies must compete for limited donor resources and government funding, all of which need to be effectively and efficiently managed. Despite the importance of economics in an increasingly competitive environment, rarely are financial considerations the primary mission of non-profits whose objectives may be less tangible and more compassionate (Kaplan 2001).

Sense making is drawing on experiences to establish routine patterns of thinking for situations where explanations are not readily available. Du Toit (2003, p.28) claims that patterns of routine thinking can limit innovative thinking. AAMH had suffered from several debilitating IT setbacks: HAL had been outsourced to a vendor with consequential and ongoing problems of system’s ownership; IT infrastructure was and still is contracted to third-party consultant XData; and the memory of an EMR project failure was still fresh in individual and corporate memories. The tendency to revert to older established patterns for solving problems could prove to be a barrier for AAMH, hindering the transition to more advanced technologies. Tam, the BI Project Manager, with insight from experiences in other BI projects, summed up the AAMH executive managers’ perceptions and their misinterpretations of the BI project, as follows:

*The whole purpose of this research was going to be, can we do it on a budget? The problem is, we didn't get far enough to write that business case. SSIS [SQL Server Integration Services] comes pre-packaged in the SQL server so they had this already. That's free, so the technology I'm telling you about, their data warehouse layer is completely free, they are licensed for it. They don't need to go out and buy additional tools.*

This statement evokes the observations of Weick (1995, p.55) and Weick, Sutcliffe and Obstfeld (2005, p.147) in their claims that studies assessing the accuracy of managers’ decisions are rare and that perceptions by managers may often be inaccurate. In reality, AAMH was not at a mature BI readiness stage, most of all, lacking a committed business and/or senior management sponsor, a critical success factor from an industry BI assessment framework proposed by deHenry (2007). This was confirmed in a comment by Tam, when reflecting on the AAMH decision, “You really need a business sponsor and that’s – yeah – that’s a tricky one”.

Klein, Moon and Hoffman (2006) argue that sense making does not always follow the rational cognitive stages of decision making from data to information to knowledge to action and finally decisions, or the sequential stages of the innovation–decision process conceptualised by Rogers (1995). Outcomes can be unexpected. Certainly in the case of AAMH where indications were that a go-ahead on the BI project was a logical choice, the no-go decision was unexpected.
BI was a significant component of the strategic plan being developed by AAMH at that time, the plan carrying long-term repercussions for the organisation. The decision by executive managers not to go ahead with the BI project was unexpected. In exploring the decision-making processes leading to the decision, the researcher used a sense-making conceptual framework which gave insights into four levels of sense making: cultural, social, individual and organisational. Each level provided revelations as explained in the illustrations section of this paper and contributed to the response to the research problem, developed in the background section of the paper, namely, “explain how sense making influences decision making in the context of healthcare business intelligence in the not-for-profit sector”.

To make sense of the perceived disruptions surrounding the proposed BI system, executive managers looked for a solution which enabled AAMH to resume normal activities. The decision makers of AAMH with their experience in aviation, healthcare, and finance were found to be more comfortable purchasing multi-million dollar Cessna Grand Caravans aircraft than expending financially on a BI system, perceiving it to be immature technology, and sceptical of the benefits it might deliver. For an organisation like AAMH, to commit to an IS project outside their core business and likely to cost scarce resources, BI was a huge undertaking. While a conservative approach is often prudent, it may also be responsible for thwarting innovative decisions. In essence, the study found that, despite some individual support for BI, corporate memory of a recent failed EHR project, inaccuracies of perception of the intent of the BI project, and lack of commitment and sponsorship by senior management drove AAMH decision makers to reject the BI project.

The contributions of this paper relate to its objectives, both of which have been realised. The AAMH case study has been analysed by applying the sense-making framework affording the researcher a chance to better understand the decision by company executives not to go-ahead with the BI project. In this case study, the sense-making framework has been extended into the NFP sector and allied with concepts from an industry BI assessment framework (deHenry 2007), enabling reflections useful for evaluating the readiness of NFPs to adopt complex IS such as BI. These are the theoretical and practical contributions which should have value for human actors striving to avoid the pitfalls of commitments to innovative BI projects when organisations have not reached requisite socio-technical maturity.

The study has limitations. It would benefit from expansion to include a second group of participants (such as government funders Queensland Health, AAMH base data entry staff, and IT consultants XData) with all perspectives contributing to a fuller understanding of the need for effective business processes and efficient decision making. There are several avenues for future research, one of which is to combine sense making with institutional theory for viewing the AAMH case through another theoretical lens. These theories have been successfully used in combination by Jensen, Kjærgaard and Svejvig (2009) in an empirical Danish healthcare study. Most importantly, is the imperative to study the significance of senior management sponsorship for complex IS projects in NFP settings.
References


# Appendix A: Interview Summaries

<table>
<thead>
<tr>
<th>Interview Date</th>
<th>Interviewee (Pseudonym)</th>
<th>Position</th>
<th>IS and/or Methodologies Described by Interviewee</th>
</tr>
</thead>
<tbody>
<tr>
<td>17th June 2010</td>
<td>Roslyn</td>
<td>HR Manager</td>
<td>Combined HRIS (Chris21)</td>
</tr>
<tr>
<td>17th June 2010</td>
<td>Joanne</td>
<td>General Manager Support Services</td>
<td>Payroll System, Microsoft Office, Electronic Document Management System (EDMS)</td>
</tr>
<tr>
<td>9th July 2010 and 12th July 2011</td>
<td>Neil</td>
<td>ICT Manager</td>
<td>Microsoft Exchange, Microsoft Reporting Service, SQL Server, Unified Communications (VOIP), Prince2 Methodology, Business Process Modelling Notation (BPMN)</td>
</tr>
<tr>
<td>9th July 2010</td>
<td>David</td>
<td>Quality and Risk Manager</td>
<td>Risk Management Information Systems</td>
</tr>
<tr>
<td>9th July 2010</td>
<td>Victoria</td>
<td>Senior Health Information Manager</td>
<td>Health Aviation Logistics (HAL), Medical Director (MD3), Electronic Medical Records (EMR)</td>
</tr>
<tr>
<td>12th July 2011</td>
<td>Barry</td>
<td>General Manager Aviation</td>
<td>Rostering System</td>
</tr>
<tr>
<td>12th July 2011</td>
<td>Sally</td>
<td>Senior Manager Health Informatics</td>
<td>Crystal Reports, Extraction Transformation Load (ETL)</td>
</tr>
<tr>
<td>12th July 2011</td>
<td>Gordon</td>
<td>Chief Financial Officer</td>
<td>Finance1</td>
</tr>
<tr>
<td>12th July 2011</td>
<td>Samuel</td>
<td>General Manager Health Services</td>
<td>ABCD Audits, Electronic Health Records (EHR), Business Objects Pivot Tables</td>
</tr>
<tr>
<td>12th July 2011</td>
<td>Jon</td>
<td>IT Consultant to AAMH</td>
<td>Microsoft SharePoint, SQL 2000, Aerological Flight Report (AFRPT)</td>
</tr>
<tr>
<td>14th November 2011</td>
<td>Tam</td>
<td>BI Project Manager (independent interviewee)</td>
<td>Data Marts, Data Warehouse, Operational Data Stores</td>
</tr>
<tr>
<td>16th December 2009 and 27th October 2010</td>
<td>Kay</td>
<td>Chair Queensland Board of Directors</td>
<td>Interviews were informal, unstructured, and not recorded. Interview data was not used.</td>
</tr>
<tr>
<td>28th June 2011 and 22nd August 2011</td>
<td>Geoffrey</td>
<td>CEO Queensland, AAMH</td>
<td>Interviews were informal, unstructured, and not recorded. Interview data was not used.</td>
</tr>
</tbody>
</table>