

2017

A SECI-Based Knowledge Conversion Model of Business Process Capture

Diane Strode

Whitireia Polytechnic, diane.strode@alumni.unimelb.edu.au

Adrian Hargreaves

Whitireia Polytechnic, adrian.hargreaves@whitireia.ac.nz

Jech Chung

Whitireia Polytechnic, jech.82@gmail.com

Follow this and additional works at: <https://aisel.aisnet.org/acis2017>

Recommended Citation

Strode, Diane; Hargreaves, Adrian; and Chung, Jech, "A SECI-Based Knowledge Conversion Model of Business Process Capture" (2017). *ACIS 2017 Proceedings*. 28.

<https://aisel.aisnet.org/acis2017/28>

This material is brought to you by the Australasian (ACIS) at AIS Electronic Library (AISeL). It has been accepted for inclusion in ACIS 2017 Proceedings by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact elibrary@aisnet.org.

A SECI-Based Knowledge Conversion Model of Business Process Capture

Jeng Cherng Chung

School of Information Technology
Whitireia Polytechnic
Wellington, New Zealand
Email: jech.82@gmail.com

A. Hargreaves

School of Information Technology
Whitireia Polytechnic
Wellington, New Zealand
Email: adrian.hargreaves@whitiriria.ac.nz

D. E. Strode

School of Information Technology
Whitireia Polytechnic
Wellington, New Zealand
Email: diane.strode@whitiriria.ac.nz

Abstract

Business process capture is a first step in the larger endeavour of business process management. In this paper, we view business process capture as a knowledge conversion process. We explore the conversion of knowledge when business analysts capture information about business processes from domain experts. We identify seven process capture activities in an analysis of comments made by business analysts in response to open-ended questions in an online survey. The seven activities are combining, confirming, engaging soft skills, involving, simplifying, tailoring, and training. We show how these activities involve the transfer of tacit and explicit knowledge between the business analyst and the domain expert and how the transfer conforms to the SECI modes of knowledge conversion, well known in the research domain of knowledge management. The paper contributes a SECI-based knowledge conversion model of business process capture and insight for business analysts about business process capture activities.

Keywords Business process capture, Business process elicitation, Business process validation, Business analyst's role, tacit and explicit knowledge.

1 Introduction

The purpose of capturing a business process is ultimately to create a map of, or document, the process, so an organisation can understand their process at a high conceptual level (Rosemann and vom Brocke 2015). Such understanding enables more effective process management and potential process reorganisation or automation. In addition, business process capture is often a necessary precursor to understanding, designing, or implementing digital information systems.

The capture of a business process as a map, model, or written description involves both elicitation of the process from those who best understand it and validation that the process is captured accurately (Dumas et al. 2013). Typically, one or more business analysts discuss the process of interest with one or more domain experts (also known as subject matter experts) familiar with the process. Once the business process has been captured and documented in a model, the model is then verified with the expert to validate that it accurately reflects the process of interest. In some cases, a business process can be elicited by studying existing artifacts such as written procedures, automated systems, datasets, or by observing a work flow (Dumas et al. 2013). These latter forms are not the focus in this research, we focus on the elicitation and validation of business processes occurring when the business analyst draws forth the knowledge of the domain expert with the aim of converting that knowledge into a process model.

Business process capture is a first step in the larger endeavour of business process management. There is a wealth of research on business process management (Vom Brocke and Rosemann 2010), including business process analysis, modelling techniques and languages, and business process re-engineering. Research focuses on which models are used (Davies et al. 2006), how models are used (Zur Muehlen and Recker 2013), categorises and compares languages (Mili et al. 2010), and introduces new elicitation methods and tools (Front et al. 2017). Within this body of knowledge, current understanding and practical insights as to how experienced analysts apply elicitation and validation techniques when capturing business processes is limited. This lack of insight into business process capture led us to pose the research question: *How do business analysts elicit and validate business processes in practice?*

We consider that eliciting and validating business processes, by drawing forth the knowledge of the domain expert and converting that knowledge into a business process model, is organisational knowledge conversion. There is a significant body of research on knowledge conversion, in particular the well-regarded SECI modes for converting between tacit and explicit knowledge that contribute to organisational knowledge creation (Nonaka et al. 2000). Nonaka et al. (2000, p. 8), propose that *“knowledge is created through interactions between tacit and explicit knowledge, rather than from tacit or explicit knowledge alone”*. The SECI modes of socialisation, externalisation, confirmation, and internalisation describe the transfer of tacit and explicit knowledge. These modes seem particularly salient to business processes capture because the tacit knowledge of the business process held in the mind of the domain expert, is shared with the business analyst and is then embodied in a business process model, a form of explicit knowledge, the purpose of which is to provide an organisation with knowledge about its processes. Therefore, this paper addresses the research question and also explores the applicability of the SECI knowledge conversion modes in the context of business process capture.

To address the research question and explore potential SECI modes in business process capture, we analysed comments written by business analysts in response to open-ended questions within an online survey. Following a general inductive approach described by Thomas (2006), we found seven activities reported during elicitation and validation of business process models. We then analysed the data in a deductive manner as described by Schreier (2014) using SECI modes as a coding frame, and found that the activities conform to a knowledge conversion process of the type theorised by Nonaka et al. (2000).

This paper is organised as follows. First, we describe how business processes are captured and the roles of the domain expert and business analyst in business process elicitation and validation. Then we describe the SECI modes of knowledge conversion and the small body of research linking SECI-based theory with business process modelling. We describe the two-phase research design, including the open-ended survey questions. This is followed by our analysis and findings. In the discussion and conclusion, we answer the research question, discuss implications for business process research and for the practice of business process capture, discuss the research limitations, and pose future research directions.

2 Capture: Eliciting and Validating Business Processes

A business process is the *“end-to-end work across an enterprise that creates customer value”* (Hammer 2015, p. 4), and business process management is *“the discipline that combines knowledge from information technology and knowledge from management sciences and applies this to operational*

business processes” (Van Der Aalst 2013, p. 1). Capturing a business process involves gathering information about an existing process and creating an “*as-is*” process model (Dumas et al. 2013). Once the process is embedded within a model, the model is verified with the stakeholders who enact the process of concern. The goal is to create a model of a business process so it is visible to all stakeholders. In many cases, the stakeholder most knowledgeable about the business process is the domain expert. In this paper we refer to the domain expert as an expert and we refer to the business analyst as an analyst (referred to as a process analyst by Dumas et al. (2013)).

When eliciting and validating business processes with experts, the analyst can draw upon an extensive toolkit of techniques, models, and modelling tools (Mili et al. 2010; Rosemann and vom Brocke 2015). This toolkit ranges from informal natural language techniques such as interviews, focus groups, or drawing rich pictures, to formal business process modelling methods such as Unified Modeling Language and Business Process Modeling Language (Avison and Fitzgerald 2006; Dumas et al. 2013).

Few realistic business processes are simple production lines requiring a simple workflow model to describe them. Models are developed by capturing multiple business activities from end to end that all lead to a specific outcome. Then the analyst designs a generic process model that accounts for all of the variations in those business activities that achieve the same goal (Vom Brocke and Rosemann 2010). The problem when eliciting a business process is that, although there are many languages and tools for business process modelling there is a gap in knowledge about how a process is captured and made explicit when it resides in the minds of the people involved in the process. The problem is described by Dumas et al. (2013) who explains that there are two key stakeholders in business process capture; the expert who has a deep understanding of the business process to be mapped but limited understanding of modelling concepts, and the analyst who has deep understanding of process analysis and modelling but limited understanding of the process of interest. The analyst must rely on the expert to explain the nuances of the process whereas the expert relies on the analyst to organise their process knowledge and create an accurate descriptive model. This paper explores the activities of this knowledge exchange from the perspective of the business analyst.

3 The SECI Process

Throughout the 1980s and 90s, Nonaka and his colleagues developed a theory of organisational knowledge creation explaining how new knowledge propagates from individuals, to project teams, to the wider organisation, and ultimately to society (Nonaka 1994; Nonaka et al. 2000). This theory is one of the foundations of the domain of knowledge management. In Nonaka’s theory, knowledge creation has three interacting elements.

- 1) Organisations provide a context or place (named *ba*; a Japanese word), where knowledge is created.
- 2) Knowledge is created in a cyclic process whereby the tacit knowledge of individuals is converted to explicit knowledge, which is reintegrated into the organisation as tacit knowledge. This knowledge conversion occurs through the SECI modes of socialisation, combination externalisation, and internalisation.
- 3) Knowledge assets, which are “*firm specific resource[s] that are indispensable to create values for the firm*” (Nonaka et al. 2000, p. 20). Knowledge assets can be experiential, conceptual, routine, or systemic.

The SECI process of knowledge conversion is the focus of this paper. Before defining the four SECI modes, we first define three terms used in SECI literature, explicit knowledge, tacit knowledge, and shared mental models. According to Smith (2001), explicit knowledge is “*academic knowledge or ‘know-what’ that is described in formal language, print or electronic media, often based on established work processes, [and uses a] people-to-documents approach*” (Smith 2001, p. 314), whereas tacit knowledge is “*practical, action-oriented knowledge or ‘know-how’ based on practice, acquired by personal experience, seldom expressed openly, often resembles intuition*”. A shared mental model occurs when “*team members hold common or overlapping cognitive representations of task requirements, procedures and role responsibilities*” (Converse et al. 1993, p. 222). The four SECI modes are defined by Nonaka et al. (2000) are as follows.

- 1) *Socialisation* converts tacit knowledge to tacit knowledge. Socialisation is acquired through shared experience achieved by spending time together in the same environment. Tacit knowledge comprises world views and mental models, and involves mutual trust. In socialisation, tacit knowledge is shared between individuals or among a group.

- 2) *Externalisation* converts tacit knowledge to explicit knowledge. That is, internalised knowledge is drawn into the public domain and made concrete, enabling it to be shared among people and become the basis of new knowledge.
- 3) *Combination* converts explicit knowledge to explicit knowledge. That is, existing explicit knowledge is converted into more complex and systematic groupings creating new explicit knowledge. Combination includes both aggregation of knowledge into higher levels of abstraction and decomposition of knowledge into more detailed components.
- 4) *Internalisation* converts explicit knowledge to tacit knowledge. Through internalisation, explicit knowledge created is shared throughout an organisation and converted into tacit knowledge by individuals. Explicit knowledge is internalised to become part of individuals' tacit knowledge bases in the form of shared mental models or technical know-how.

A small body of literature makes the argument that business process modelling is a knowledge conversion and creation process. For example, Gronau et al. (2004) propose a knowledge management approach based on SECI modes, ba, and a knowledge modelling description language (KMDL). That research aimed to improve modelling tools used for capturing processes. Rito Silva and Rosemann (2012) applied the SECI process to analyse the problems of traditional top-down BPM (Business Process Management) approaches and BPM collaborative modelling tools. They studied how the SECI modes apply in a wiki (online collaborative software) environment to identify how tacit knowledge is captured in the bottom-up approach. The authors then present requirements for a hybrid BPM approach that combines both top-down and bottom-up methods. SECI has also been applied as a theoretical underpinning for a case study of agile business process development by Bider and Jalali (2014). This small body of research indicates that business process management can be at least partially explained by the SECI modes, but we are aware of no literature focusing purely on the activities of business process capture viewed as a SECI knowledge conversion process.

4 Research Design

This research aimed to explore how business analysts elicit and validate business processes in practice, and identify activities that analysts employ during their interaction with experts. A further aim was to explore the applicability of the SECI modes to this capture process.

The data for this study came from the qualitative sections of a primarily quantitative online survey questionnaire. The survey was sent to 322 people on the LinkedIn™ professional networking social media site (<https://www.linkedin.com/>) who identified themselves as currently employed business analysts working in New Zealand. Each analyst was sent an invitation email with a link to the survey developed using LimeSurvey™. All written comments made by the analysts on the survey were collated. The survey and full set of comments is available in Chung (2016). The open-ended questions in the survey that prompted the respondents to write comments, were as follows.

1. How frequently do you reconfirm the business process model with your domain expert?
2. How easy is it for the domain expert to confirm the final business process model?
3. How easily does the domain expert understand the business process modelling languages?
4. How easy is it for the domain expert to actively participate in validating the business process model?
5. How quickly does the domain expert understand the subtleties of the business process model?

Immediately following each of these questions, the respondent was asked “Please write any additional comments you have in the box below”.

A final request at the end of the questionnaire was:

6. Please provide your insights into the effectiveness of the approaches you use when validating process requirements with domain experts.

84 people responded to the invitation, which is 26.10% of those contacted. 78 questionnaires were fully completed. 42 respondents made comments, providing 78 independent comments overall (some respondents wrote a comment on more than one of the questions). To analyse the comments we chose qualitative methods because qualitative methods provide detail and nuanced understanding on a topic where existing theory is weak or does not exist (Edmondson and McManus 2007).

There were two main phases of analysis. In the first phase, we followed a general inductive approach appropriate for analysing qualitative data such as written comments, as described by Thomas (2006). One researcher read each comment and noted recurring themes related to the process of capturing

business process knowledge. As the business analyst performs actions to capture a business process, we wrote each theme as an active verb; an activity. Next, we defined each activity based on a Standard English dictionary definition (<https://en.oxforddictionaries.com/>) and then developed a context-appropriate definition based on the dictionary definition but more aligned with business process capture. Two researchers reviewed and slightly adjusted the wording of the business process capture definitions. Table 1 shows the activities and the two definitions for each activity.

To check the validity of the analysis of comments and identification of activities, further analysis was carried out again by all three researchers' 6-months after the first analysis. The three researchers independently matched the comments, or a phrase within a comment, to the identified activities. Once the independent analysis was complete, we checked that for each activity, all three researchers agreed on at least one quote (i.e. a comment or phrase in the data) that illustrated the activity. After this analysis, we found that for each activity, we had independently selected two or three of the same quotes. Therefore, in this phase the presence of each activity was confirmed and no new activities were identified. Table 1 shows a quote for each activity. Each activity had multiple quotes from different analysts but Table 1 shows only a selection of these. Note that a quote can refer to more than one activity.

The second phase of analysis was to determine if the seven activities of business process capture align with the SECI modes of knowledge conversion. In this deductive phase, we used the SECI modes as a coding frame as described by Schreier (2014). This analysis was done by each researcher independently matching each quote identified in phase one, to a SECI mode. We then compared our analysis and checked that we had all categorised at least one quote into the same mode. For those quotes shown in Table 1, we indicate the mode each quote was assigned to. Each mode aligned with at least one business process capture activity and sometimes two activities.

5 Analysis and Findings

We found seven activities performed during business process capture (alphabetically); combining, confirming, and engaging soft skills, involving, simplifying, tailoring, and training.

Combining is carried out by the analyst to adjust the way the model, the modelling language, techniques, or notations are presented to the expert when discussing the business process. One analyst explained, *"I use a combination of process maps, use cases, user stories, story boards, wire frames, screen mock-ups, data flows, 'one pagers', etc."*

During the capture process, the business analyst also involves the domain expert in confirming or verifying that the business process model accurately reflects the process of interest, because, as one analyst said, *"reviewing business process models with domain experts often helps pick up parts of the process they hadn't realised existed, or parts of the process that aren't working."*

The business analyst engages his or her soft skills to create harmony and interact effectively with the domain expert. An analyst mentioned soft skills in this way: *"... probe the questions in depth, active listening, making sure that common terminology is understood, avoidance of acronyms."*

The analyst involves the expert in the process of capture to ensure the expert is fully consulted and engaged. Involvement ranges from *"Frequently asking for feedback"* to *"conducting a walkthrough often"*.

Simplifying is carried out to hide or remove certain complex elements of a modelling language when discussing a process model. This is shown in the comment, *"people understand things better when you don't have to explain to them what the different notations mean, e.g. a time boxed activity (box with a clock) or a sub process (box with a + sign). The most effective processes I have done are with simple boxes naming what the boxes mean."*

Tailoring adjusts the way the model, the modelling language, techniques, or notations are presented to the expert based on his or her level of knowledge. One analyst explained that *"strict by the book process models tend not to work well, normally you use them as a base and then have to tailor the level of detail being provided based on the stakeholder you are working with."*

Training is used in business process capture to inform the expert about the notation, languages, or modelling techniques used to embody the business process of interest, and to enable them to participate more fully in capturing the existing process and verifying the business process model. Training includes formal teaching, coaching, and walkthroughs of existing models, and teaching domain experts about modelling during informal discussions.

Activity	Dictionary definition Context-appropriate definition	Sample quotes <ul style="list-style-type: none"> • [I1; R2] refers to survey item 1 and the response from respondent 2 • [SECI: mode] refers to the mode from Nonaka et al.'s (2000) model • Underlined phrases highlight one activity identified in the quote
Combining	<ul style="list-style-type: none"> • Joining or merging something for a common purpose. • Refers to combining a variety of views (models) of the business process 	<ul style="list-style-type: none"> • <i>“Using a range of mediums to validate process requirements is critical to helping communicating process requirements. I <u>use a combination</u> of process maps, use cases, user stories, story boards, wire frames, screen mock-ups, data flows, 'one pagers', etc. Depending on the domain expert and the audience I will use one or a range of the above to get the message across. Using a combination of views helps to validate the process particularly if you are working with multiple SMEs to show an end to end view, therefore, one view does not fit all!” [I13; R36] [SECI: Combination]</i>
Confirming	<ul style="list-style-type: none"> • Establishing the truth or correctness of something. • Refers to getting feedback from the domain expert to ensure the business process model is correct 	<ul style="list-style-type: none"> • <i>“Reviewing <u>business process models with domain experts</u> often helps pick up parts of the process they hadn't realised existed, or parts of the process that aren't working. It can often highlight how complicated a process actually is.” [I13; R46] [SECI: Externalisation]</i> • <i>“Sometimes I draft out what I think the process is on my own, then <u>run through it with each stakeholder to confirm.</u>” [I4; R9] [SECI: Externalisation]</i>
Engaging soft skills	<ul style="list-style-type: none"> • Using the personal attributes that enable someone to interact effectively and harmoniously with other people. • Refers to the way the business analyst uses appropriate interpersonal skills to interact effectively with a domain expert. 	<ul style="list-style-type: none"> • <i>“One of your key tasks (that will never be in a project plan or any IT Books) is <u>to build up and relate to people</u> across a broad range of diverse backgrounds - make sure that you tailor the conversation to a level that the other person can understand (I tend to use analogies for simple everyday common items when explaining complicated processes or things - it makes sure that technology is not there to scare and also that you <u>build the rapport with the stakeholder...</u> Finally - <u>have fun</u> – nothing - nothing is that important that you can't inject a little levity and humour (particular very dry subjects like IT). [I13; R31]. [SECI: Socialisation]</i> • <i>“I think that sometimes, the tools and techniques used to document business process are too complex for SMEs to review and validate easily. I have to <u>use all of my other "soft skills"</u> to get my <u>stakeholders to understand</u> how the process has been documented, without having to get them to research the technique or notation.” [I13, R89] [SECI: Socialisation]</i>
Involving	<ul style="list-style-type: none"> • Having something or including something as a necessary or integral part or result. • Refers to directly engaging with the domain expert in eliciting or validating business processes 	<ul style="list-style-type: none"> • <i>“<u>Involve them throughout the process.</u> Starting with current state helps the DE better understand the approach. Frequently asking for feedback familiarises the DE with the tool you are using. Conduction a walk through often.” [I13; R23] [SECI: Socialisation]</i> • <i>“The approach we use puts a lot of responsibility in the hands of the domain experts. ... Placing the responsibility on the domain experts and business owners thus far has led to a lot <u>more engagement</u> and a change in culture toward process being a part of every role.” [I13; R55] [SECI: Socialisation]</i>

Activity	Dictionary definition Context-appropriate definition	Sample quotes
Simplifying	<ul style="list-style-type: none"> Making something simpler or easier to do or understand. Refers to using the basic notation of business process modelling languages or tools in preference to the advanced notation. 	<ul style="list-style-type: none"> [I1; R2] refers to survey item 1 and the response from respondent 2 [SECI: mode] refers to the mode from Nonaka et al.'s (2000) model Underlined phrases highlight one activity identified in the quote <hr/> <ul style="list-style-type: none"> "In saying that, we do <u>use a reduced set of notations</u> from BPMN2. We selected which we will use based on the ability of the business to easily understand the models." [I4; R77] [SECI: Internalisation] "It also depends on what level of BPMN that is used. I tend <u>to strip it right back to basics</u> when consulting with stakeholders as explaining the nuances of the diagram is a waste of valuable time!" [I4; R30] [SECI: Internalisation] "I would never expose a stakeholder with a diagram of full BPMN 2 notation down to the lowest level. I would <u>use a simplified diagram</u> and the meaning is conveyed in the conversation. I might then elect to model the complexity but only if it had a specific purpose." [I5; R30] [SECI: Internalisation]
Tailoring	<ul style="list-style-type: none"> Making or adapting for a particular purpose or person. Refers to changing or adapting certain business process modelling languages or tools to suit the domain expert's level of understanding. 	<ul style="list-style-type: none"> "We <u>devised a new method</u> closer to describing business processes in formal logic and domain driven languages. We divide and document the levels of detail of the business process into at least 2 in order to make it easier for different stakeholders to understand the business process activities happening." [I3; R180] [SECI: Combination] "These answers are based on <u>tailoring the business process models</u> to only use notation that the domain expert understands or can be easily taught. Keep it simple!" [I4;R21] [SECI: Internalisation]
Training	<ul style="list-style-type: none"> Teaching a particular skill through sustained practice and instruction. Refers to training the domain expert in using or understanding the complex notation of the business process modelling language and tools. 	<ul style="list-style-type: none"> "1. Plan and <u>conduct workshop</u> with domain experts to gather requirements (during workshop - explain tools and notations that are used to model the business process) 2. <u>Walk through</u> the documented business process to ensure requirements are captured accurately and domain experts understand them. 3. Steps 1 and 2 are done repeated until all business requirements are captured." [I13; R37] [SECI: Internalisation]
KEY	SME = subject matter expert = domain expert	

Table 1. Evidence mapping business process activities to example quotes and SECI modes

In the second phase of analysis, we found evidence for the presence of socialisation, externalisation, combination, and internalisation during business process capture. This indicates that business process capture involves knowledge conversion between the analyst and the expert. The relationships we found between the SECI modes and business process capture activities are shown in Figure 1, and explained as follows (the seven capture activities are shown in bold in the following paragraphs).

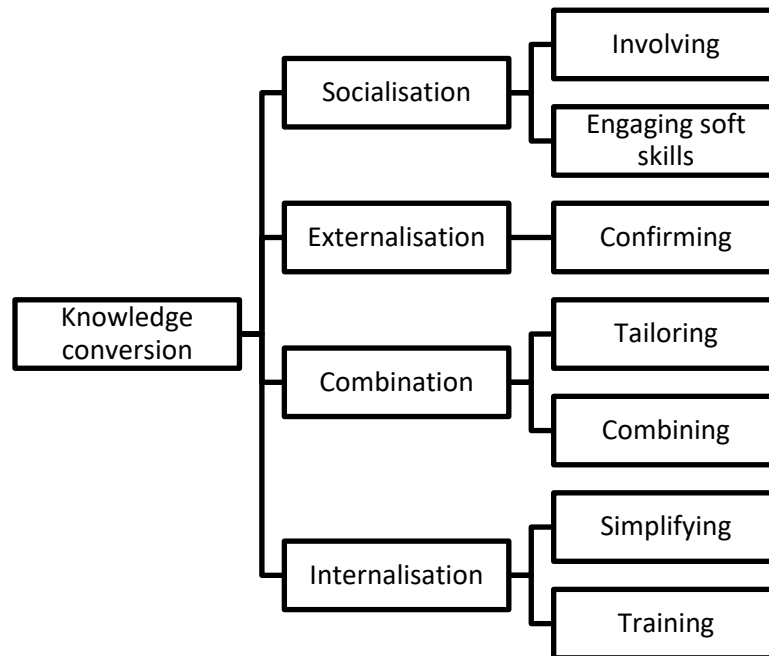


Figure 1 A SECI knowledge conversion model of the activities of business process capture

Socialisation converts tacit knowledge to tacit knowledge. Socialisation occurs when the analyst **involves** the expert in capturing the process by frequent contact and by asking for feedback. The analyst **engages his or her soft skills** to better communicate with the expert by accommodating the expert's preferred means of conveying their process knowledge. In these two activities, the analyst and the expert share with one another their tacit knowledge of modelling and the details of the process of interest respectively.

Externalisation converts tacit knowledge to explicit knowledge. Externalisation occurs when the analyst **confirms** the proposed model with the expert. In confirming the model, the tacit knowledge of the expert is made explicit.

Combination converts explicit knowledge to explicit knowledge. Combination occurs when the analyst adjusts the way the business process is presented to the expert by **combining** different modelling methods or notations or by **tailoring** modelling language notation or tools to match a particular domain expert's level of understanding.

Internalisation converts explicit knowledge to tacit knowledge. Internalisation occurs when the analyst **simplifies** a complex business process modelling notation. That is, the explicit knowledge embedded in a model is simplified to make it easier for the expert to embed the model concepts as tacit knowledge. Internalisation also occurs when the explicit knowledge of the analyst is conveyed to the domain expert in **training**. In this process, the modelling notation is explained to the expert so he or she can understand, internalise, or make implicit, knowledge about the model or the modelling language.

6 Discussion

This paper explored how analysts capture (i.e. elicit and validate) business processes. We found seven activities take place. The analyst 1) involves the domain expert in the capture process; the analyst 2) simplifies, 3) tailors, and 4) combines modelling techniques to aid the capture process; the analyst 5) trains the expert in the modelling languages and techniques; the analyst 6) confirms the captured business process model with the expert; the analyst 7) engages their soft skills to facilitate business

process capture. In addition, we posed a knowledge conversion model of business process capture by mapping these activities to the SECI modes of socialisation, combination, internalisation, and externalisation.

The literature on business process management pays scant attention to business process capture, often assuming the process is simple and unproblematic. Dumas et al. (2013) do acknowledge the process is not straightforward, “*indeed, gathering information often proves to be cumbersome and time-consuming in practice*” (Dumas et al. 2013, p. 155). Dumas’ group identify problems in process discovery and pose process discovery mechanisms such as analysis of documents and automated systems, workshops, interviews, and work observations. Our findings contribute to knowledge about process discovery mechanisms because Dumas et al. (2013) do not identify any of the seven activities that analysts employ in process discovery when interacting with experts, as we have done.

The contribution of this paper to theory is a SECI-based model of business process capture. This model shows how business process capture is an example of organisational knowledge conversion because each of the seven activities is evidence of a SECI mode. As explained in the section on SECI, according to Nonaka et al. (2000) there are three elements of knowledge creation. Our model shows that business process capture satisfies one of those elements; knowledge conversion. How business process capture might satisfy the other two elements, which are ba and knowledge assets, and therefore can be conceptualised as a complete knowledge creation process is left to future research.

Contributions to the practice of business analysis include a more nuanced understanding of the activities that business analysts employ when capturing a business process from an expert. This will aid inexperienced analysts in understanding that the process is not simple but involves at least seven individual activities. Our findings can therefore contribute to the training of business analysts. Currently, the competencies of business analysts are published by the British Computer Society (2017) and described in books (Paul et al. 2014) but seven distinct activities employed in process capture are not mentioned in the literature, with the exception of involvement which has a sound research base (Butler and Fitzgerald 2001; Cavaye 1995). Our findings can also inform tool-makers so they understand the need to design flexible tools that support simplifying, tailoring, and combining business process models, modelling languages, and notations. In addition, our model might also inform information systems developers concerned about requirements capture in systems development. Our findings indicate that involvement, confirming models, and engaging soft skills are important activities in business process capture, each of which is also pertinent to requirements capture in information systems development (Ahmed et al. 2012; Beck et al. 2001; Cavaye 1995). Training the stakeholder in modelling techniques is little researched, although our analyst respondents reported that they do this with experts. This indicates the need for more research into the phenomenon of training the expert to determine how common it is, and its value in business process capture and requirements capture.

This research has limitations. We analysed our activities against a single well-known model of knowledge conversion, the SECI model. Other theories of knowledge creation could be used to explore business process capture from different perspectives. Indeed, the SECI model has critics, such as Gourlay (2006), who argues that the modes are ill-defined. Alternative models of knowledge creation might provide different insights into the interaction between the analyst, expert, and process model. For example, the analytical lens of Transactive memory systems (Lewis and Herndon 2011), shared mental models (Cannon-Bowers et al. 1993), or dialectical theory (Walton 2004).

Further limitations of this research are that the analysts were from a single country and the findings need to be confirmed with a broader sample from other countries where experiences might vary due to organisation size, culture, or analyst training. In addition, only the activities that business analysts choose to write about were captured in the survey comments, other activities could be present but they did not take the time to write about. A more significant limitation is that the research is one-sided because the view of the domain expert is not present in the data.

Future work should verify the activities of business process capture found in this research using, for example, large-scale case studies or other methods to identify any additional activities, any relationships between the activities, activity sequences, or sub-activities. The mapping of activities to SECI could also be verified with additional research using one or more different research methods. Encompassing the perspective of the expert would also expand and strengthen this SECI model of knowledge conversion. Furthermore, an exploration of ba and knowledge assets in the context of business process capture is necessary. In this way, a complete understanding of business process capture could be achieved. This would give surety that analysts and experts are using the most appropriate activities and creating an environment conducive to effective and efficient capture of business processes, leading to better models, and improved business process management.

7 Conclusion

In this paper, we have identified seven distinct activities carried out by business analysts when they interact with domain experts to capture organisational business processes. These activities include combining, confirming, engaging soft skills, involving, simplifying, tailoring, and training. We have also posed a SECI-based model of business process capture. That is, we used the SECI model of knowledge conversion to explain how the seven activities of business process capture form a knowledge conversion process. We show how these activities conform to a SECI-based model because each activity is an instance of socialisation, externalisation, combination, or internalisation of tacit and explicit knowledge.

This research provides insight into the activities of business process capture, which is valuable because efficient and effective capture is fundamental to accurate meaningful business process modelling. Quality models contribute to improved understanding of “as-is” processes, which in turn supports the design of new improved business processes for supporting organisational functions. The value of our SECI-based model of business process capture is that it provides a basis for future research to investigate the elements of ba and knowledge assets and thus inform our understanding of business process capture as an organisational knowledge creation process.

8 References

2017. "A Practical Approach to Recognising and Improving Competencies in Your Business Analysts." United Kingdom: British Computer Society.
- Ahmed, F., Capretz, L.F., and Campbell, P. 2012. "Evaluating the Demand for Soft Skills in Software Development," *IT Professional* (14:1), pp. 44-49.
- Avison, D., and Fitzgerald, G. 2006. *Information Systems Development: Methodologies, Techniques and Tools*, (4 ed.). London: McGraw-Hill.
- Beck, K., Beedle, M., van Bennekum, A., Cockburn, A., Cunningham, W., Fowler, M., Grenning, J., Highsmith, J., Hunt, A., Jeffries, R., Kern, J., Marick, B., Martin, R.C., Mellor, S., Schwaber, K., Sutherland, J., and Thomas, D. 2001. "Manifesto for Agile Software Development." Retrieved 1 January 2012, from <http://www.agilemanifesto.org>
- Bider, I., and Jalali, A. 2014. "Agile Business Process Development: Why, How and When—Applying Nonaka’s Theory of Knowledge Transformation to Business Process Development," *Information Systems and e-Business Management* (14:4), pp. 693-731.
- Butler, T., and Fitzgerald, B. 2001. "The Relationship between User Participation and the Management of Change Surrounding the Development of Information Systems: A European Perspective," *Journal of End User Computing* (13:1), pp. 12-25.
- Cannon-Bowers, J.A., Salas, E., and Converse, S. 1993. "Shared Mental Models in Expert Team Decision Making," in *Individual and Group Decision Making: Current Issues*, N.J. Castellan (ed.). Hove: Lawrence Erlbaum Associates, pp. 221-246.
- Cavaye, A.L.M. 1995. "User Participation in System Development Revisited," *Information and Management* (28:5), pp. 311-323.
- Chung, J.C. 2016. "Investigating How Business Analysts Capture Business Processes within Organisations." School of Information Technology, Whitireia Polytechnic, New Zealand. Retrieved from https://www.academia.edu/33627357/Investigating_how_business_analysts_capture_business_processes_within_organisations.
- Converse, S., Cannon-Bowers, J., and Salas, E. 1993. "Shared Mental Models in Expert Team Decision Making," in *Individual and Group Decision Making: Current Issues*, N.J. Castellan (ed.). London, UK: Lawrence Erlbaum and Associates, pp. 221-246.
- Davies, I., Green, P., Rosemann, M., Indulska, M., and Gallo, S. 2006. "How Do Practitioners Use Conceptual Modeling in Practice?," *Data & Knowledge Engineering* (58:3), pp. 358-380.
- Dumas, M., La Rosa, M., Mendling, J., and Reijers, H.A. 2013. "Process Discovery.," in *Fundamentals of Business Process Management*. Heidelberg: Springer, pp. 155-184.
- Edmondson, A.C., and McManus, S.E. 2007. "Methodological Fit in Management Field Research," *Academy of Management Review* (32:4), pp. 1155-1179.

- Front, A., Rieu, D., Santorum, M., and Movahedian, F. 2017. "A Participative End-User Method for Multi-Perspective Business Process Elicitation and Improvement," *Software and Systems Modeling* (16:3), pp. 1-24.
- Gourlay, S. 2006. "Conceptualizing Knowledge Creation: A Critique of Nonaka's Theory," *Journal of management studies* (43:7), pp. 1415-1436.
- Gronau, N., Müller, C., and Uslar, M. 2004. "The KMDL Knowledge Management Approach: Integrating Knowledge Conversions and Business Process Modeling.," in *Proceedings of the 5th International Conference on Practical Aspects of Knowledge Management, Pakm 2004, Vienna, Austria, December 2-3, 2004.*, D. Karagiannis and U. Reimer (eds.). Berlin, Heidelberg: Springer, pp. 1-10.
- Hammer, M. 2015. "What Is Business Process Management?," in *Handbook on Business Process Management 1*, M. vom Brock and M. Rosemann (eds.). Heidelberg: Springer, pp. 3-16.
- Lewis, K., and Herndon, B. 2011. "Transactive Memory Systems: Current Issues and Future Research Directions," *Organization Science* (22:5), pp. 1254-1265.
- Mili, H., Tremblay, G., Jaoude, G.B., Lefebvre, É., Elabed, L., and Boussaidi, G.E. 2010. "Business Process Modeling Languages: Sorting through the Alphabet Soup," *ACM Computing Surveys (CSUR)* (43:1), p. 4.
- Nonaka, I. 1994. "A Dynamic Theory of Organizational Knowledge Creation," *Organization science* (5:1), pp. 14-37.
- Nonaka, I., Toyama, R., and Konno, N. 2000. "SECI, Ba and Leadership: A Unified Model of Dynamic Knowledge Creation," *Long range planning* (33:1), pp. 5-34.
- Paul, D., Cadle, J., and Yeates, D. (eds.). 2014. *Business Analysis*. Swindon, UK: BCS The Chartered Institute for IT.
- Rito Silva, A., and Rosemann, M. 2012. "Processpedia: An Ecological Environment for BPM Stakeholders' Collaboration," *Business Process Management Journal* (18:1), pp. 20-42.
- Rosemann, M., and vom Brocke, J. 2015. "The Six Core Elements of Business Process Management," in *Handbook on Business Process Management 1*. Springer, pp. 105-122.
- Schreier, M. 2014. "Qualitative Content Analysis," in *The Sage Handbook of Qualitative Data Analysis*, U. Flick (ed.). London, UK: SAGE Publications Ltd, pp. 170-184.
- Smith, E.A. 2001. "The Role of Tacit and Explicit Knowledge in the Workplace," *Journal of Knowledge Management* (5:4), pp. 311-321.
- Thomas, D.R. 2006. "A General Inductive Approach for Analyzing Qualitative Evaluation Data," *American Journal of Evaluation* (27:2), pp. 237-246.
- Van Der Aalst, W.M. 2013. "Business Process Management: A Comprehensive Survey," *ISRN Software Engineering* (Article ID 507984.), pp. 1-37.
- Vom Brocke, J., and Rosemann, M. 2010. *Handbook on Business Process Management*. Springer.
- Walton, D. 2004. "A New Dialectical Theory of Explanation," *Philosophical Explorations* (7:1), pp. 71-89.
- Zur Muehlen, M., and Recker, J. 2013. "How Much Language Is Enough? Theoretical and Practical Use of the Business Process Modeling Notation," in *Seminal Contributions to Information Systems Engineering*. Springer, pp. 429-443.

Acknowledgements

We thank the business analysts who contributed their insights to this research.

Copyright

Copyright: © 2017 Chung, Hargreaves, Strode. This is an open-access article distributed under the terms of the [Creative Commons Attribution-NonCommercial 3.0 Australia License](https://creativecommons.org/licenses/by-nc/3.0/au/), which permits non-commercial use, distribution, and reproduction in any medium, provided the original author and ACIS are credited.