

## Using NVivo as a Research Management Tool: a Case Narrative

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### Abstract

*This paper presents an illustrative demonstration of the qualitative data analysis tool NVivo (version 2.0), as employed across a multi-method research design as a comprehensive tool in support of overall research management. The paper will be of interest to (a) **novice researchers**, as a reference in their research design efforts; (b) **academics**, involved in research training, where this narrative can be used as a rich teaching case and; potentially to (c) **vendors**, of similar software tools, who may identify potential new tool applications and valuable tool enhancements.*

### INTRODUCTION

The combining of research methods in Information Systems (IS) research has received much applause. The advantages from a multi-method research design have been clearly enunciated (e.g. Gable 1994). Kaplan and Duchon, 1988:575) suggest "Collecting different kinds of data by different methods from different sources provides a wider range of coverage that may result in a fuller picture of the research problem" ... "it provides a richer, contextual basis for interpreting and validating results". The virtues of combining case study and survey methods have been particularly touted (Gable 1994). Nevertheless, multi-method research is uncommon; one of several deterrents being the management of large and diverse data sets and related evolutionary, voluminous and unwieldy data analyses. Jemmont (2002) suggests the challenge is "How to manage large data sets ... How to keep track of data ... How to keep track of the ongoing analysis conducted."

It is suggested that most of these research data management challenges can be substantially ameliorated through use of appropriate software, and through adherence to underpinning methods and procedures. Additionally, the electronic capture of research data and related research results can facilitate views on the data not otherwise possible. "Researchers can link and compare patterns within and across documents and the results can be saved, printed or undone at will" (Walsh, 2003, p. 253). Where data are methodically coded and stored in appropriate repositories, that collected in one phase can be readily accessed and analysed efficiently along with data collected in a subsequent phase of the research design.

This paper presents a detailed narrative on how the qualitative data analysis tool NVivo has been employed across an IS study as a comprehensive tool in support of the overall research effort. The primary purpose of this narrative is to provide the reader with an illustrative demonstration of how the tool was applied within the various stages of the referent multi-method study design. Emphasis herein, rather than on the qualitative data analysis capabilities of NVivo, is on its virtues when applied more extensively and holistically; "you can use NVivo to support research project management .... It is especially useful with large data sets, or when you may wish to return to data for re-analysis" (Action and Research web page). NVivo can be used to support management of research activity within each phase and across phases, and to evolve a repository which can be regularly revisited as data is gathered and analysed as the research project matures and proceeds to subsequent phases.

The remainder of this paper consists of six (6) sections. First, a brief introduction to the referent-study is provided. Then, the NVivo tool is briefly introduced. Next each of the three (3) main phases of the study wherein NVivo was employed (as depicted in Figure 1) is discussed in detail. Finally, lessons learnt are summarized.

The paper will be of interest to (a) novice researchers, as a reference in their research design efforts; (b) academics, involved in research training, where this narrative can be used as a rich teaching case and; potentially to (c) vendors, of similar software tools, who may identify potential new tool applications and valuable tool enhancements.

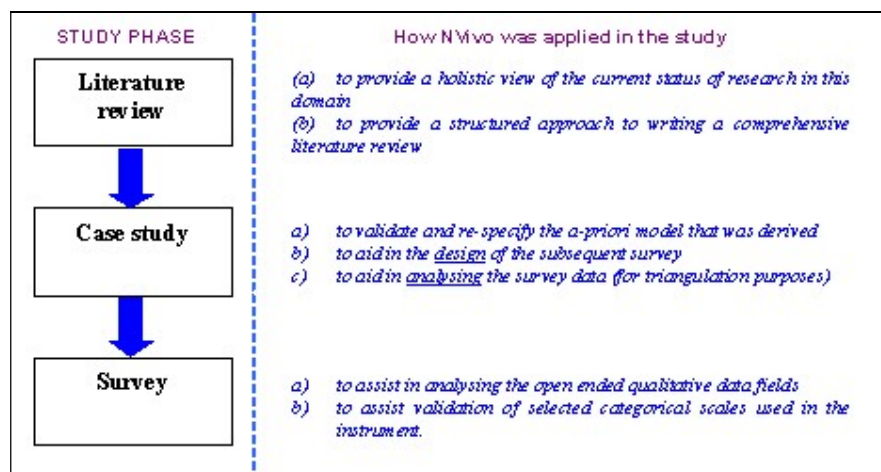


Figure 1: Where NVivo was used in the referent-study

## THE REFERENT-STUDY

The referent-study was of process modelling success factors and measures. Business process modelling has gained widespread acceptance, particularly in large IT-enabled business projects. It is applied as a process design and management technique across all project lifecycle phases. While there has been much research on process modelling (PM), there has been little attention to ‘how to’ conduct PM effectively, or on the evaluation of PM initiatives and outcomes. The referent study addresses this gap by deriving a model of PM success factors (independent variables) and success dimensions (dependent variables); addressing the two primary research questions:

*What are the critical antecedent factors of process modelling?*

*How can process modelling success be measured?*

The referent-study employed a multi-method approach, blending both qualitative and quantitative research methods. The research design commenced with a comprehensive literature review, including the first annotated bibliography of process modelling research. A multiple case study approach was used to build the conceptual PM success model resulting in a model with eleven (11) success factors (namely - modeller expertise, team structure, project management, user competence, user participation, management support, leadership, communication, modelling tool, modelling language and modelling methodology), two (2) moderating variables (process complexity and project importance) and five (5) process modelling success dimensions (modeller satisfaction, model quality, user satisfaction, model use and modelling impact). This conceptual model was then operationalised and tested employing a global sample of respondents to an online survey instrument. 290 valid responses were received. The PM model constructs were analysed, seeking a parsimonious, valid and reliable model. NVivo was used across these core phases of the study to manage the overall research effort.

## INTRODUCING THE TOOL: NVIVO

NVivo is a computer program for qualitative data analysis that allows one to import and code textual data, edit the text; retrieve, review and recode coded data; search for combinations of words in the text or patterns in the coding; and import from or export data to other quantitative analysis software. NVivo was developed by QSR International, the makers of NUD\*IST. QSR’s first product was created in 1981 (then called NUD\*IST) to support social science research and contained tools for innovative ‘Non-Numerical Unstructured Data Indexing Searching and Theorizing’. The product suites and services offered by QSR have evolved over the years. The latest version of the product was released in February 2006, called NVivo 7.0. However, this study used NVivo version 2.0. It takes time and effort to learn and master NVivo, and it is not the intention of this narrative to provide a tutorial on the tool in general. For specific details on the tool and its features, Exhibit 1 includes a list of selected useful resources. The remainder of this paper is written assuming that the reader is familiar with the basic functionality and interfaces of NVivo 2.0.

NVivo is an easy-to-learn tool, because it works like the ‘old-loose-leaf’ binder that many qualitative researchers of the past are familiar with (Walsh, 2003, p. 253). NVivo opens with a small window referred to as the Launch Pad (a.k.a Project Pad) which has four core tool functions: (i) create a new project, (ii) open an existing project, (iii) open a tutorial, and (iv) exit the program (see Exhibit 2). The NVivo help, online tutorials and the above mentioned resources (Exhibit 1), describe navigation and functionality in detail. This section next very briefly introduces several core elements of the tool, to ease subsequent discussion.

All data is arranged around **Documents** and **Nodes** – the two main working frameworks within the tool. Documents are simply data that one analyses in the study. All NVivo 2.0 documents are in rich text format. Nodes are places where one stores ideas and categories. It is important to note the difference between a code and a node, in NVivo parlance. A Node is a physical location where you store the groups of ideas that would be coded. Thus, coding (putting things into codes) is a *process*; a way to label certain aspects of the data and to sort information in distinct categories. The node on the other hand holds all the information that has been coded under a certain category. **Attributes** are properties assigned to nodes or documents. Once attributes are defined, each document or node will have specific values for each attribute. These attribute values can be numeric, string, Boolean or date-time type. These attributes can be usefully applied for better data management and effective searches. The NVivo **Search** tool can be used to search for strings, coding patterns or attribute values in the project database. These features enable the user to search for patterns across their data.

## APPLYING NVIVO IN THE LITERATURE REVIEW PHASE

The literature review phase of this study had several goals. NVivo was used here as a qualitative data analysis technique to synthesize and manage the plethora of literature with two primary intentions:

- to provide a holistic view of the current status of research in the study domain , and
- to provide a structured approach to writing a comprehensive literature review.

This section will describe how the tool was used to pursue these goals. First, a justification of why a tool like NVivo is useful for a literature review is provided. Then the basic procedures to setup the tool in preparation for a literature review are presented. This section closes with a step-by-step demonstration of how the tool was used for the two objectives listed above.

### Why use a tool like NVivo for a literature review?

“Literature reviews are a common feature of all dissertations, regardless of discipline or subject matter. However, they are usually overlooked as a form of qualitative analysis, yet the processes involved in building an argument from a body of literature are similar to processes involved in analysing qualitative data” (Di Gregario, 2000, p.2). There are other tools, like ENDNOTE, to support the bibliographic management aspect of a literature review. But qualitative software tools like NVivo and ATLAS, can be used for the synthesis process; thus, rather than being competitors, they complement. Di Gregario (2000, p 2) states “only NVivo (to date) has a particular set of tools that is ideal for analysing literature”.

### Getting ready to use NVivo for the literature review

The first step in a literature review is to search and find relevant references pertaining to the topic<sup>1</sup>. However, this section assumes that the researcher has already completed searching and is focused on evaluating the extracted literature. It illustrates how the NVivo tool was used from the point of identifying a useful piece of work; to the point of writing a synthesized literature review (thus the literature searching and extracting strategies are not discussed).

Whenever possible, articles were saved in text format and imported into NVivo directly. While this was deemed useful by the researcher, others who have used NVivo for similar purposes state that “*on a practical level, they occupy too much space*” (Di Gregario, 2000, p. 5) and that on an analytical level, it is better to read and summarize articles than include the entire work in the database. Regardless, in this study, the researcher stored the entire text version of the articles whenever it was available, and found this to be particularly useful to:

- search the entire collection of literature for a new key theme,
- compare notes and ideas collected from literature across a subset of researchers, and
- reference a single repository of literature (hence no need for any original copies stored elsewhere).

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<sup>1</sup> The detailed search strategies used for article identification in this study are not discussed here.

When the text version of an article was not available, a **proxy document** was created to highlight the key information extractable from the article. A proxy document is simply a representation of a particular piece of work (i.e. like a set of summary notes resulting after reading an article; with page numbers, sample quotes). In such situations the original version of the article was saved in an external directory/folder and was considered a complementing element that belonged with the NVivo repository.

All these documents were maintained within NVivo's Document view (see Exhibit 3), where documents were saved by authors' name(s) and year.

Document attributes were maintained for every document in the database to enable effective analysis (see Exhibit 1), including:

- **Context** (to take note of sub sections of the discipline in which the chosen articles' emphasis/specialization is);
- **Source type** (to indicate the article was from the web, a book chapter, conference or journal);
- **Source name** (to maintain the exact name of the source (in abbreviated form<sup>2</sup>);
- **Year** (to maintain the year of publication);
- **Research method** (to maintain the reported research methodology/design applied (when not reported, a category as 'unknown' was used);

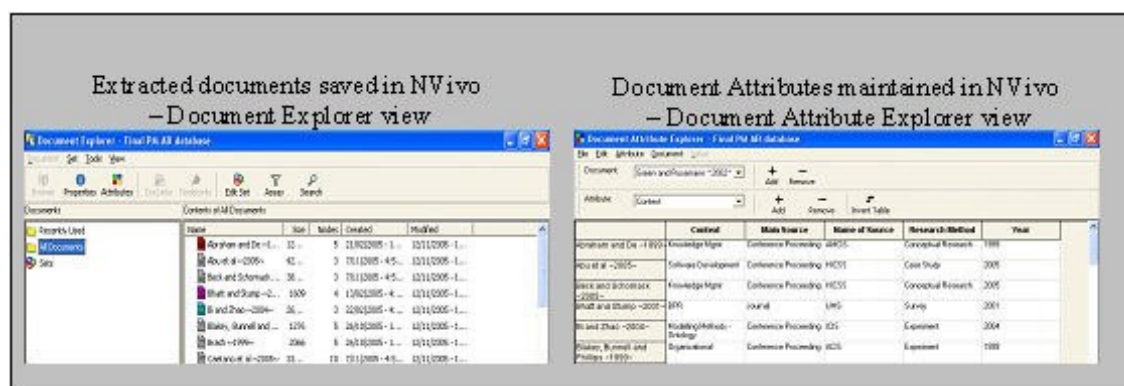


Exhibit 1: Getting started with NVivo

When drafting the literature review for any piece of work (e.g. article, thesis), it is a bonus if one has a predefined conception of how ideas will be structured. Most literature reviews share common themes like 'definitions of key concepts', 'historical overview of the development of the discipline'. In preparation for writing the literature review for the referent study, such a predefined set of themes was identified prior to analysing the articles, in order to assist the researcher in identifying potential topic areas to extract information on. These themes were then entered into NVivo as Nodes – which formed a blank template of 'folders' to help the researcher codify the articles as she read; an ostensibly top-down approach to analysis. While reading through articles, useful or interesting new themes were identified, and the starting node list was extended to codify emerging themes derived bottom-up from the literature. Thus, codification of the literature can be described as a joint **top-down and bottom-up** approach.

While the discussion above described how the NVivo tool was set up for the literature review, the following two sections will illustrate how NVivo assisted in addressing the two main goals (listed above) of this study's literature review process.

### NVivo - an enabler to effectively illustrate the current status of a research domain

As mentioned above, a primary goal of this analysis was to provide a holistic view of the current status of research in the study domain. The domain under investigation in the referent study - Business Process Modelling, is still very young, yet growing rapidly. Hence, early enumeration of "primary process modelling research outlets", "primary research methods applied within process modelling studies", "process modelling research contexts". proved useful for this, then novice researcher in the field. In example, Exhibit 2 depicts how the primary process modelling research outlets were identified and analytically presented.

<sup>2</sup> i.e. MISQ for Management Information Systems Quarterly Journal. Complete lists of these acronyms were maintained separately as an index.

**Step 1:** The documents were searched for, extracted and saved within NVivo as explained above.

**Step 2:** The attributes of these were maintained while reading and coding the documents.

**Step 3:** The search features together with the basic ‘document attribute explorer’ were used to derive summary statistics of the attributes maintained.

**Step 4:** This information was manually extracted to Excel, from which graphs and summary tables were derived for reporting purposes.

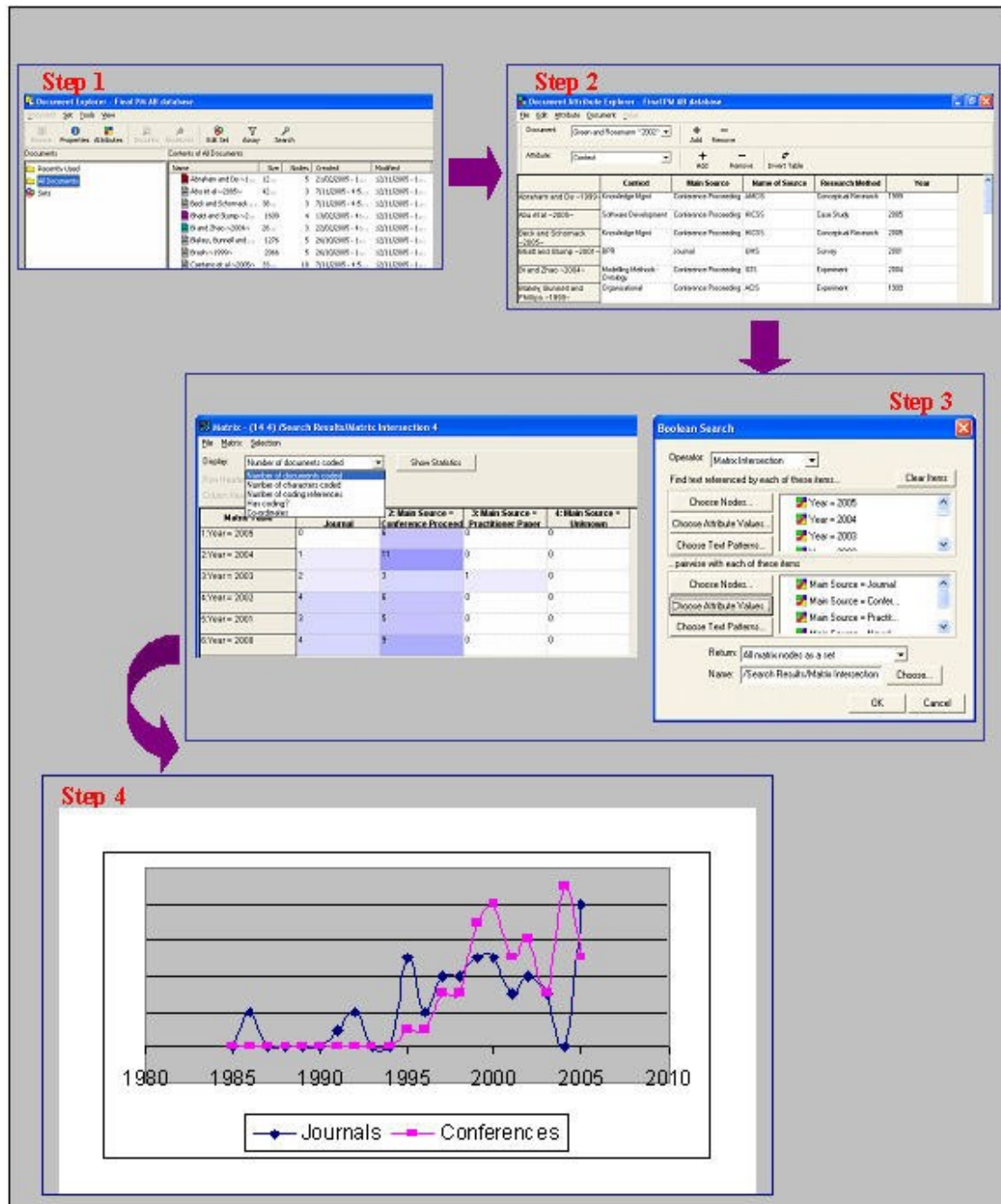


Exhibit 2: Illustration of how NVivo was used for identifying primary outlets and patterns of the discipline

### NVivo - an enabler to efficiently write a synthesized literature review

The other key reason for using NVivo in the literature review phase was to provide a structured approach to the process of writing the literature review. The steps followed to obtain this are described below.



**Step 1:** The documents were searched for, extracted and saved within NVivo.

**Step 2:** While reading the documents, useful information was codified and saved within nodes. As explained earlier, these nodes were aligned with the draft structure of the literature review, and were used as ‘idea placements’.

**Step 3:** Information within the nodes were extracted via the ‘browse-node’ option to derive at the material that was to be used for fleshing out the content within each prior determined sub topic area.

**Step 4:** This information was integrated into the draft write-up of the literature review.

## APPLYING NVIVO FOR THE CASE STUDY PHASE

The case study phase of the referent-study had three (3) primary goals:

- To validate and re-specify the a-priori model that had been derived
- To aid in the design of the subsequent survey, and
- To aid in analysing the survey data

First, the basic procedures to setup the tool in preparation for case study analysis is presented. The next sections will describe how the tool supported the study to obtain these goals, with step by step demonstrative illustrations<sup>3</sup>.

### Setting up NVivo for case data analysis


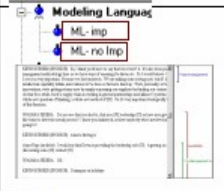
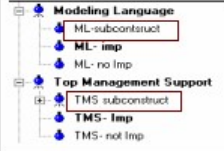
Phase	Description		Objective
• <b>Phase 1: Map data to constructs of the a priori model</b>	This phase populated the nodes created with the A priori constructs (whenever the construct was mentioned or hinted at, it was coded with the relevant node(s)). When potential new constructs were identified, new nodes were created and data coded. This round was conducted twice and sometimes, data that were coded only under one construct were coded under more constructs when relevant.		Primarily → (Objective i) Secondarily → (Objective iii)
• <b>Phase 2: Analyse the coded constructs</b>	The data coded under each node was re-analysed, to make sure that they did belong to the coded node. Further more, the coded data was then further coded to separate between citations that indicated mere existence of the constructs versus those that specifically stated the criticality of the construct		Primarily → (Objective i) Secondarily → (Objective ii)
• <b>Phase 3: Conduct in-vivo coding</b>	Once the data which belonged to the overall constructs were extracted, in-vivo coding (coding with the key words identified within the text) was conducted as an attempt to tease out potential sub constructs that should be considered when developing the measurement instrument		Primarily → (Objective ii) Secondarily → (Objective iii)

Exhibit 3: Planning the codification process

The referent-study involved 9 case studies (where the unit of analysis was each process modelling project) across 3 case sites (see Bandara et al., 2005 for specific details). A new NVivo database was opened for each new case site, and all interview transcripts were loaded and saved in the tool as ‘documents’ (as described earlier). Each case site was maintained in a separate database for site-based analysis. A set of empty nodes were already created, prior to any data analysis, to mirror the a-priori model that existed as at the beginning of each case study and a clear codification process was planned and followed. As Exhibit 3 depicts, this process consisted of three core phases, each purporting to address one or more of the case study objectives listed above. The illustrations in the following sections will demonstrate how this codification supported the overall analysis of the case study data.

### Using NVivo to validate and re-specify the a-priori model

<sup>3</sup> An overview of the overall case study design is presented in detail in Bandara et al., (2005).

Several sub-analyses were conducted when validating and re-specifying the a-priori model; in attention to questions such as:

- are all the important constructs captured?
- are there any constructs in the a-priori model that are not critical or relevant for process modelling success?
- are any of the constructs identified redundant?
- what type of relationships exist among the constructs (e.g. do any constructs moderate the relationship with success-factors and success-measures?)

Once the data was codified (following the procedures presented in Exhibit 3), the NVivo tool features such as counts and searches were used to address these key questions. The following section provides several illustrations. Exhibit 4 graphically illustrates how NVivo was used to analyse proposed new constructs for the model.

**Step 1:** While the a-priori constructs were captured as nodes in the case analysis phase, any new ideas or themes that were identified during the data codification/ analysis process were also captured, by codifying them under a new node.

**Step 2:** When such a prospective construct was identified, prior analysed data was reviewed again to make sure that all possible data that relates to this newly found theme was captured. Sometimes basic text searches were conducted to support this checking process, where a complete set of documents would be searched for by including a search string that described, or was a synonym of, the newly identified construct.

**Step 3:** These new nodes also had the same structure as depicted in Exhibit 3, where all general citations were captured together, and any specific positive or negative citations were coded as sub-nodes within. Furthermore, the general citations were also screened for potential sub-constructs (to support the survey design phase, if this new construct was included in the final model).

- Are there any constructs in the a-priori model that are not really critical or relevant for the final model?

**Step 1:** General counts of how many times a construct was mentioned, together with the number of times that they were specifically mentioned as important or unimportant were captured as evidence to argue the inclusion or exclusion of a construct in the final model.

**Step 2:** These counts were extracted manually into summary grids to capture all details in a holistic view, across multiple case studies (see Bandara et al., 2005 for a detailed example and discussion).

- Are any of the constructs identified redundant?

In order to test for any redundancy of the constructs, Matrix Intersection, Matrix Difference and Proximity tests were conducted.

*Matrix Intersection* search is a two-dimensional type of Boolean search made available through NVivo. It takes the searched feature from two collections at a time, and finds passages in the documents or nodes, in which the search term is contained in both. *Matrix Difference* search, another type of NVivo Boolean search, takes one feature from each collection at a time, and finds passages in the documents or nodes having the feature from the first collection but not the second. A proximity search finds passages with specific features which are close to each other. NVivo has five different types of *Proximity searches*; Co-occurrence, Sequence, Inclusion, Matrix Co-occurrence, Matrix Sequence and Matrix Inclusion<sup>4</sup>. A mixture of these was used based on the context of the constructs that were tested for.

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<sup>4</sup> *Co-occurrence* finds places where text referred to by the first item is near text referred to by the second item.

*Sequence* finds places where text referred to by the first item is before text referred to by the second item.

*Inclusion* finds places where text referred to by the first item surrounds text referred to by the second item.

*Matrix Co-occurrence* finds places where text referred to by items in the first group is pairwise near text referred to by items in the second group.

*Matrix Sequence* finds places where text referred to by items in the first group is pairwise before text referred to by items in the second group.

*Matrix Inclusion* finds places where text referred to by items in the first group pairwise surrounds text referred to by items in the second group (extracted from NVivo online help).

**Step 1:** In order to identify areas of potential overlap between constructs, a basic Matrix Intersection search was first conducted. When an overlap was identified, the content that was coded under both nodes was extracted and analyzed, simply by clicking on the cell(s) of the resulting Matrix Intersection search.

**Step 2:** In order to identify if these constructs were actually different to each other, a basic Matrix Difference search was done with the two constructs been identified (very similar to Step 1).

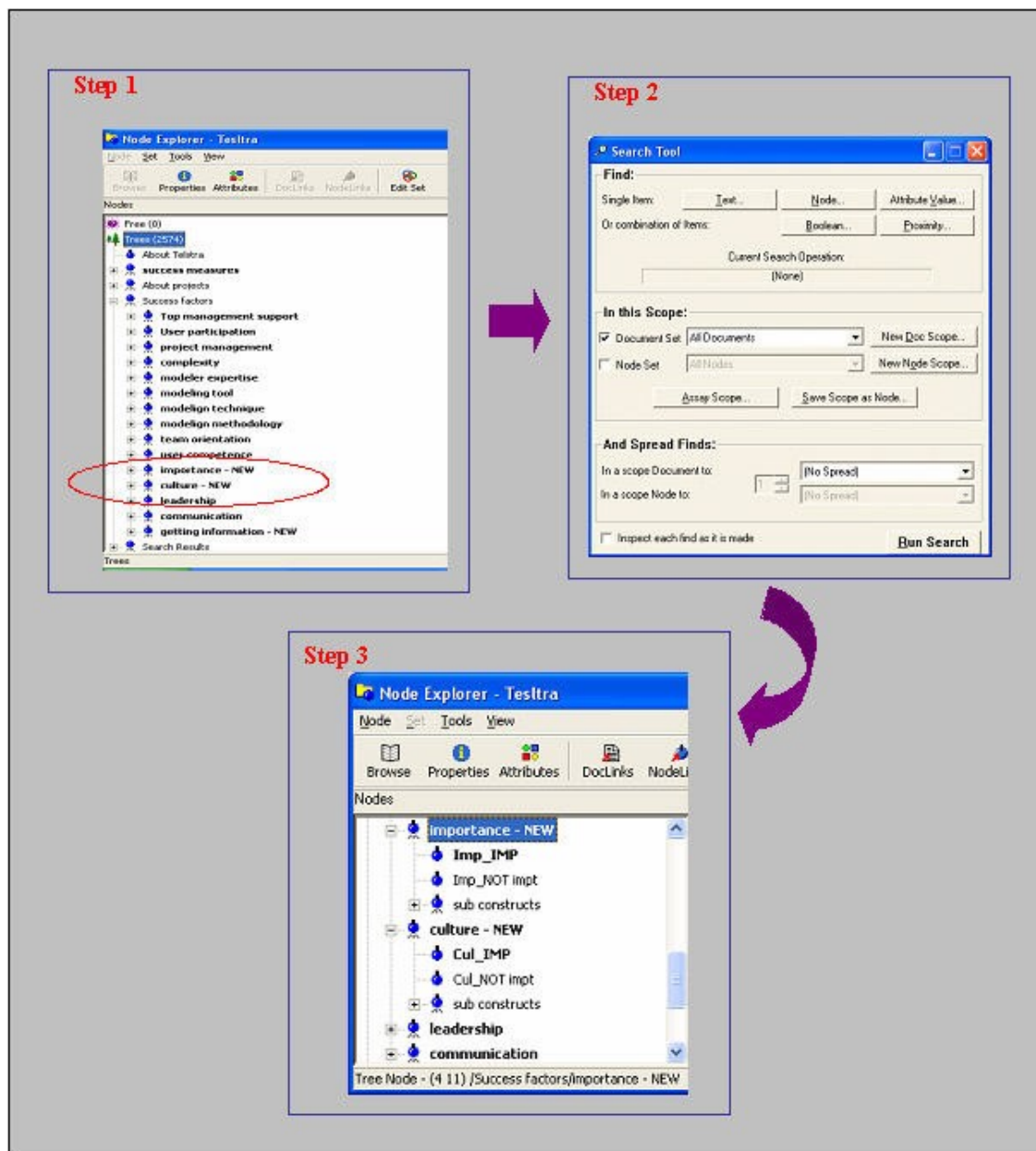


Exhibit 4: Analysing new constructs

**Step 3:** Different proximity searches were conducted to compliment the information gathered in the above two steps. The information extracted from these proximity tests sometimes supported the researcher to provide a more synthesized explanation to support the reasoning of the analysis process.

- What type of relationships existed with these constructs?

The process described above was also repeated with constructs that were hypothesized as moderating/ mediating variables in the model.



**Step 1:** A basic Matrix Intersection search was conducted to identify areas of overlap. The text extracted from these was analyzed very carefully to assist in identifying any moderating/ mediating relationships between the constructs.

**Step 2:** Proximity checks were conducted in parallel to these matrix searches to assist in identifying where a construct most often would fit in the model.

The results from these various tests were analyzed in conjunction with each other, when the final decisions on the case data based model re-specification took place [see Bandara et al., (2005) for a detailed example]. For example, an a-priori construct may be deleted for one or more of the following reasons;

- having only a few general citations, and /or
- having one or two strong citations for its irrelevance as a construct, and /or
- the data coded under this construct also been coded under another – hence depicting possible redundancy or overlap
- Similarly, a new construct may be included based on one or more of the following reasons;
- having many general citations, stating this new construct, and /or having one or two strong citations for its high relevance as a construct, and /or an overarching theme (construct) been identified that captures more than one of the a-priori constructs<sup>5</sup>.

### **Using NVivo to aid in the subsequent survey phase**

The case study data was also used to support in the design of the survey; the preceding phase of the study. This was primarily in relation to (a) deriving the correct set of constructs, (b) deriving the hypothesis to be tested and (c) identifying potential evidence to form the items. (a) and (b) were described in detail earlier.

**Step 1:** As described in phase 3 of Exhibit 3; any potential sub constructs that were identifiable from the data were maintained separately under each construct node.

**Step 2:** All the potential sub constructs across all case studies were extracted and systematically reviewed with further evidence from literature to derive the survey items of this study. Data stored within these nodes were used as evidence to derive and justify instrument items.

Data maintained within the NVivo case databases, were also used in the later survey analysis phase when further evidence to an observation was sought for. For instance, when a general observation made through the case study data was further tested with quantitative data gathered through the survey, quotes from the case data were extracted (when relevant) as further evidence and explanation of the survey analysis results.

## **APPLYING NVIVO FOR THE SURVEY PHASE**

The survey designed from this study consisted of a range of close and open ended questions (qualitative data) that had to be analysed and new scales (some categorical, some interval) that were used for the first time. NVivo was used within this phase to:

- a) assist in analysing the open ended qualitative data fields, and
- b) assist validate selected categorical scales used in the instrument.

See Table 1 for an overview of when NVivo was used and for what goal.

The following sections will take one example relating to each of the three objectives listed above and illustrate in detail how the tool was applied.

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<sup>5</sup> Identified by advanced matrix searches

	<b>Construct under investigation</b>	<b>Survey question</b>	<b>Purpose of using NVivo</b>
1	Respondents' role	<i>If you selected 'other', please briefly describe your role:</i>	(a) → To identify what the other roles are.
2	Respondents' training profile	<i>If you received other forms of training, please specify them here:</i>	→ To identify what the other training options were, and (b) → To validate the training scale that was used for the first time in this study.
3	Modelling Objectives	<i>.... list the process modelling objectives :</i>	→ To identify what the other objectives were, and (b) → To validate the process modelling objective scale that was adopted from a prior study (Davies et al, 2005).
4	Modelling Tool	<i>Please specify up to 5 process modelling tools used in the project and indicate the tool that was used most.</i>	→ To identify what the primary and secondary modelling tools were.
7	Modelling Technique	<i>Please specify up to 5 process modelling techniques used in the project and indicate the single technique that was used most</i>	(a)→ To identify what the primary and secondary modelling techniques were.

Table 1: Where NVivo was applied to support the analysis of the survey data

#### Using NVivo to analyse the open ended qualitative data fields

This section will illustrate how the tool was used to derive a classification of primary modelling tools reported from the 290 responses in the survey database. Exhibit 5 depicts this process in a graphical view.

**Step 1:** The single column with all the documented modelling tools was extracted from the original data file and saved as a text file.

**Step 2:** This file was then exported to NVivo as a document.

**Step 3:** A complete data driven-bottom-up approach was used to map these statements with potential tool types. Each line of text was analysed to see, if that statement could be associated with a type of tool. A new node was created for every first mention of a tool name (note that every tool name was checked for its existence using a web search<sup>6</sup>, prior to recording in the database) and the relevant statements were codified under these nodes. When a statement related to an existing tool node, it was coded under that node, thus populating the different categories as the analysis took place. All statements were coded under only one category. Any doubts or self notes were also captured in the process with NVivo memos.

**Step 4:** Summary statistics of this mapping process was derived from NVivo.

Step 5: These details were (manually) extracted to Excel, which was then used to derive the relevant graphs and interpretations.

#### Using NVivo to validate selected categorical scales used in the instrument

This section illustrates how the tool was used to test and validate the 'modelling objectives' scale used. Exhibit 6 depicts this process in a graphical view. In this example, a scale already existed to capture the responses in prior established clusters, and only the open ended "others" section had to be analysed using NVivo.

<sup>6</sup> Typing the search term "<Name of the tool proposed>, modeling, tool" in Google.

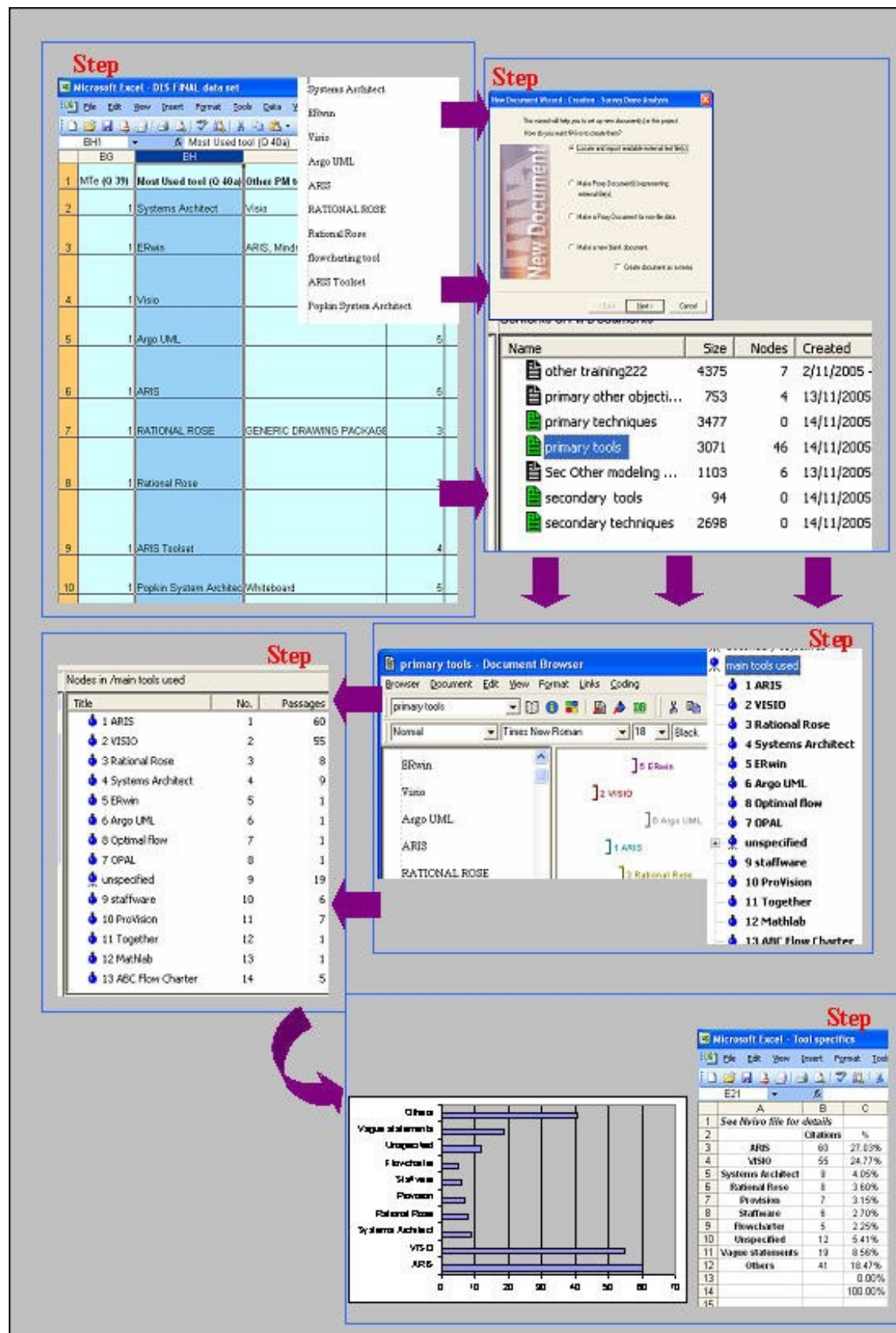
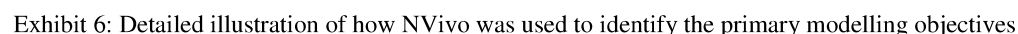


Exhibit 5: Detailed illustration of how NVivo was used to identify the primary tools used



**Step 1:** A frequency distribution was derived to view the number of citations for each of the existing categories of the original scale (from within the raw data saved in excel).

**Step 2:** The single column with all the documented 'other' modelling objectives was extracted from the original data file and saved as a text file.

**Step 3:** This file was then exported to NVivo as a document.

**Step 4:** Single nodes were created within NVivo to correspond with each of the existing categories in the original scale.

**Step 5:** This time a combined top down and bottom up approach was used to map these statements with modelling objectives. The 'other' mentioned objectives were first analysed to see if they related to an already existing modelling objective from the original list. If they did, they were mapped on to the single one that best matched with the description provided. If not, a new node was created to capture this new statement. Like before, all statements were coded only once and memos were maintained with any notes when deemed relevant.

**Step 6:** Summary statistics of this mapping process was derived from NVivo.

**Step 7:** These details were (manually) extracted to Excel. The original frequencies were adjusted to accommodate the results of this mapping process. Relevant graphs and interpretations were derived from this analysis.

## LESSONS LEARNT

The researcher was a novice to qualitative research in general and to the use of qualitative tools like NVivo. While the use of the tool has been an immense asset to manage the plethora of data and ideas cross many different phases of a long term research study, a lot of learning's were gathered through this trail and error process. These are summarized below, after categorizing them into two groups: limitations due to lack of expertise and those that are tool related.

### Limitations due to lack of expertise

While the tool was used extensively across the different phases of the study, not all sub-phases were supported with NVivo. For example, a significant effort was put into identifying literature to support the item derivation process. This could have been better managed with the use of a tool like NVivo. There were some functionality within the tool that the researcher did not have knowledge of (such as the use of 'sets', some advanced search options and the modelling capability). For example, the model functionality could have been used to identify direct relationships between published studies and sets could have been used to better organise the literature based on different demographic aspects of the paper origins. The research management of this study via NVivo may have been further improved if these had been used. Further more, the researcher could have maintained a research journal via the tool to capture not only the process but also the thoughts and the tacit knowledge associated with the process of analysing the data from the start, to the end of the study. This would have been a useful monograph for novice researchers and research trainers.

### Weaknesses due to limitations in the tool

Some tasks associated with the process described here could have made easier with minor improvements of the tool. These are documented here with the goal of reaching potential tool vendors.

NVivo only worked directly with a limited range of file types and requires the researcher to convert the data files to plain text formats, which takes away the formatting of the documents and makes the context 'messy' to read and interpret. This also makes it difficult to import important information which may be formatted as tables or footnotes. It is impossible to maintain non-text information within the tool. Ironically, in many scenarios of qualitative research, non-text data plays a crucial role in the analysis process, but the tool unfortunately does not support this. It would have been very useful to have a direct interface with Excel, especially where reports and search results from various queries can be exported directly to excel or word. The overall graphical user interface of the tool can also be improved to ease navigation and customizability.

## CONCLUSION

This paper demonstrated how NVivo is used across a multi-method study design as a research management tool. This narrative was utilised in an advanced-IT-research –methods-training unit offered by the Faculty of IT, QUT to test its suitability as a teaching and learning tool. Feedback received has been positive. Some sample quotes include:



*"I know that qualitative data analysis tools can assist in analysing text, but never realised that it can be applied in a multimethod project as an overall research management tool until I saw this example"*

*"The level of detail in the narrative as to where to find the functionality is exactly what I needed to help me plan my own study"*

(Feedback received from students enrolled in ITN 269- Advanced Research Methods in IT, Faculty of It, QUT, Sem 2, 2006)

NVivo is only one qualitative data analysis tool made available. There are many more in the market, hence it is advisable to review tool comparison articles prior to selecting a tool for this type of research management purposes. Furthermore, *"NVivo, or any Qualitative data analysis tool for that matter does not eliminate the need for the researcher to think ..."* (Jemmott, 2002, p.7). It is only as affective as one applies it. Hence for success, it is recommended that the (a) basic tool functionalities (*'what can the software do'*) are clearly understood and (b) the researcher creatively seeks ways to apply these functionalities for different purposes within different contexts. In terms of tool functionalities, (ai) training resources (books, user manuals, online help and workshops) are very useful. (aai) Tutorials embedded with the tools are also a useful asset for this purpose. In terms of (b) creative ideas on how to utilize the tool, the novice researcher can benefit significantly from (bi) descriptive narratives (of this paper's nature) and (bii) continuous hand-on practice.

## REFERENCES

- Action and Research web page, <http://www2.fhs.usyd.edu.au/arow/r/res/nvivo.htm>, last accessed April, 16<sup>th</sup>, 2006.
- Bandara, W., Gable, G. and Rosemann, M. 2005, *"Factors and Measures of business process modelling: Model building through a multiple case study"*, European Journal of Information Systems, 14, p. 347-360.
- Davies, I., Green, P., Rosemann, M., Indulska, M., and Gallo, S. 2005, *"Conceptual modelling in practice - The impact of organizational size and experience to appear in data and knowledge engineering. - The impact of organizational size and experience"*, to appear in data and knowledge engineering.
- Di Gregario, S, 2000, *"Using NVivo for your Literature Review"*, Strategies in qualitative Research: Issues and Results from Analysis Using QSR NVivo and NUD\*IST Conference at the institute of Education, London 29-30 September.
- Gable, G., G. 1994, *"Integrating Case Study and Survey research methods: an example in Information Systems"*, European Foundation of Information Systems, (3:2), p.112-126.
- Jemmott, H. 2002, *"Using Nvivo in Qualitative Data Analysis"*, Journal of Research in Education. Issue 2, [online] Available at: [www.bath.ac.uk/education/dialogue/dialogue2.7.pdf](http://www.bath.ac.uk/education/dialogue/dialogue2.7.pdf) , last accessed, June 19, 2007.
- Kaplan, B., and Duchon, D. 1988, *"Combining qualitative and quantitative methods in Information Systems research: A case study"*. MIS Quarterly, pages 571-586, December.
- Walsh, M. 2003, *"Teaching qualitative analysis using QSR NVivo"*, The Qualitative Report, Volume 8, Number 2, June 2003, 251-256, [online] Available at <http://www.nova.edu/ssss/QR/QR8-2/Walsh.pdf>, last accessed, June 19, 2007.

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