Visualization of findings on construction project portfolio management using Gioia methodology

Abstract

This aim of this paper is to demonstrate the application of the Gioia methodology used in strategic management studies to a collaborative research project that investigates project portfolio management and strategic alignment in the construction sector. It illustrates how a Gioia data structure developed from a preliminary analysis of interviews conducted in three Australian construction organizations enabled researchers from strategy, construction and project portfolio management to elaborate their findings progressively during and after a data analysis workshop. The paper points to the key processual role that visualization can play in doing research. It reports on data collected from a data analysis workshop of a research team spread across Australia and the United Kingdom. The workshop was held online, due to COVID-19 travel restrictions. The paper also reports on areas for further investigation triggered by the discussions held using the Gioia data structure. Thus, it demonstrates the value of using a visual object, that is the Gioia data structures, to trigger cross-disciplinary collaboration in a research project.

Keywords: research collaboration; Gioia methodology; construction sector; project portfolio management; organizational strategy

Introduction

The aim of this study is to demonstrate how the Gioia methodology provided a structure to visualise and iterate the development of themes from qualitative data that has supported research in strategic management disciplines (Langley & Abdallah 2011). We, the authors of this paper, apply the methodology to a collaborative research project that investigates the

alignment of projects with strategy in the construction sector. The study was supported by a competitive grant which prescribed that the research team should include researchers in both strategic management and project/construction management fields. The team included five researchers specialising in strategic management, portfolio management, organizational project management, IT project management and construction project management. The research was carried out in and compares data from two countries – Australia and the United Kingdom. This article focuses on the preliminary analysis of the research conducted in Australia using the Gioia data structures (Gioia, Corley & Hamilton 2012). During a data analysis workshop, held between researchers from Australia and UK, the UK researchers added insights from their findings to the Gioia data structures and structuring of the data presented at the workshop. The Gioia data structures were shown on the first day of the two-day data analysis workshop. On the second day of the workshop, these data structures triggered discussions of some key findings about project portfolio management (PPM) in the construction sector that will be reported in future outputs from this research. The Gioia data structures were then worked on by the Australian research team after the workshop and the progressive elaboration of the findings through these activities is presented in this paper. The value of visual objects enhancing research collaboration (Nicolini, Mengia & Swan 2012) became evident.

The reporting of using the Gioia data structures as a visual object to elaborate progressively the findings from a study is aimed to contribute to the special track in EURAM 2022 titled '*Novel research approaches to conduct process and practice studies in project organising*' hosted by the Project Organising SIG to demonstrate the value of this approach in conducting collaborative research.

Literature review

First, we provide a brief literature review of PPM and discuss the lack of research on the topic in the construction sector that gave rise to this study. Then we review the literature on qualitative data analysis to position this paper ending with a discussion of two templates used in qualitative data analysis in articles reporting on strategic management.

Project portfolio management

The Axelos standard of management of portfolios, (MoP 2011, p. 11) offers the following key definitions: An organization's portfolio is 'the totality of its investment (or segment thereof) in the changes required to achieve its strategic objectives' (p. 11) and portfolio management 'is a coordinated collection of strategic processes and decisions that together enable the most effective balance of organization change and BAU [business as usual]' (p. 11). Managing a portfolio of projects is distinct from financial or asset portfolio management due to the unique and complex nature of each project. This is because projects are usually delivered by temporary organizations that bring together and coordinate specialized knowledge, skills and resources required to complete the project goal of addressing an organisational or policy requirement of the client within time, cost, quality and other business constraints. In construction projects this often includes different tiers of sub-contractors assembled in the flow of production at different stages in the project lifespan. When a firm is running several projects in tandem and balancing the flow of new work against the resources available and the probable rate of completion of projects, it makes strategic sense to have oversight of collection of present and initiation of future projects. The Project Management Institute's Standard for Portfolio Management (PMI 2013) defines a portfolio as 'a collection of programs, projects or operations managed as a group to achieve strategic objectives' (p. 3) in which the components of a portfolio are 'measured., ranked and prioritized' (p. 3). Portfolio management is defined as the 'coordinated management of one or more portfolios

to achieve organizational strategies and objectives.' A definition from the project management literature adds that PPM 'deals with the coordination and control of multiple projects pursuing the same strategic goals and competing for the same resources, whereby managers prioritize among projects to achieve strategic benefits' (Martinsuo 2013, p. 794).

In the conventions of practice, PPM aligns projects and programs carried out by an organization with its strategy; it establishes change management to achieve these objectives and ranks, prioritizes and optimizes the selection of projects and programs alongside business as usual. To deliver the benefits expected from these portfolios the organization also balances its resources and organizes processes to implement and monitor portfolios. In a review of recent empirical research on project portfolio management, prominent project management researcher Miia Martinsuo (2013) found that 'project portfolio management has received a stable and central position both in project management research, product development management research, and companies' management practices during the past decade' (p. 794). She reports that although several frameworks have been published to guide PPM in selecting projects to align with strategy as well as allocate adequate resources and establish means to contribute to the success of portfolios, 'companies still struggle with the resource sharing problem across projects' (p. 794).

While PPM practices have been adopted by organisations involved in industry sectors such as new product development (Cooper et al., 2001; Killen et al. 2008), information technology (Daniel et al. 2014), pharmaceutical (Archer & Ghazamsadeh 2007) and financial services (Csendes 2018), we found very little research to be published in the project management literature on portfolio management practices in the construction sector. Hence, little was known about how explicit portfolio and strategic perspectives have been used to guide programs and projects in the construction sector. There is interest in the use of PPM in the

construction sector in journals outside the key project management journals (Guo et al. 2013; Arsanjani et al. 2021), which demonstrates the need for further specific project management research into how construction firms use PPM for strategic advantage.

We gathered, from members of the research team who had worked in the construction sector, that while construction firms often decided to bid on specific projects, and they did so after considering their available resources prior to bidding, their bids were rarely aligned with an explicit organizational strategy nor are they generally part of processes for managing portfolios. Anecdotally we felt that bidding for tenders tended to be ad hoc and these projects were usually delivered using project management standards rather than being conceived as part of an overall project portfolio: each project was regarded as a discrete element. Wu et al. (2016) concur, concluding that while construction companies use normative project management practices, they were not very good at dealing with multi-project optimization, attributable to their lack of experience in PPM. Guidance on what project management practitioners refer to as the 'maturity level' of PPM (Pennypacker 2005; Killen & Hunt 2013) is lacking in this sector. Some project-based construction organizations strive to build 'multi-project management capabilities to harness core common components, technologies, and knowledge across a co-ordinated stream of new products, permitting reductions in development and production costs' (Davies & Frederiksen 2010, p. 205). This type of portfolio-level management technique would enable firms to manage the flow of production strategically, without bottlenecks, gaps and the problems associated with stretched or under-utilized capabilities. How major construction firms do this portfolio balancing is the gap in the literature that links strategy and project management to which this research is oriented; practically, construction firms need to develop such links if they are to improve their portfolio management practices.

Investigation of such practices requires attention to what it is that organizations do; thus, this research first reports on the literature of qualitative data analysis used by strategic management researchers in project management research. It is on these foundations that the present research is built.

Qualitative data analysis

Qualitative data analysis is generally described as a nonlinear iterative process (Lester et al. 2019, p.98). Miles and Huberman, whose *Qualitative Data Analysis* is often used as a sourcebook on data analysis methods, observed that 'qualitative data analysis happens in a cyclic flow of activity including data reduction, data display, and conclusion drawing/verification.' Common practices used in qualitative data analysis include the following steps: (Miles & Huberman 1994, p.10).

1. Affixing codes to a set of field notes drawn from observations and interviews.
2. Noting reflections or other remarks on margins.
3. Sorting and sifting through those materials to identify similar phrases, relationships between variables, patterns, themes, distinct differences between subgroups and common sequences.
4. Isolating these patterns and processes, commonalities and differences, and taking them out to the field in the next wave of data collection.
5. Gradually elaborating a small set of generalizations that cover the consistencies discerned in the data.
6. Confronting those generalizations with a formal body of knowledge in the form of constructs or theories.

While methodologies using quantitative analysis typically employ deductive or reductive methods, qualitative analysis offers a wider palette including deductive, abductive and reflexive or inductive methods (Smyth & Morris 2007). The analysis process can also be agile and iterative across the lifecycle of analysis. This helps to develop themes from the analysis that edvolve as the analysis continues through the lifecycle. A frequently used analytical method to help this is the use of thematic analysis. Thematic analysis follows the precepts of grounded theory (Glaser & Strauss, 1967) to establish, inductively and abductively, theoretical themes in data that are based on close and detailed analysis of the original data files, usually transcriptions of various kinds of data that might have been generated through either naturally occurring conversations or may have been generated through interview processes. Project management researchers often analyse such data; for instance, Lester et al. (2019, p. 9) use the following sequence of actions to do so:

1. Preparing and organizing data for analysis, often gathered through conducting interviews or focus groups, making observational notes and reviewing documents or secondary data.
2. Transcribing the data from audio or video recordings. Transcriptions capture an accurate record of the conversations. Nowadays, automatic transcription is feasible, but the accuracy is not as good as human transcription.
3. Becoming familiar with the data. This is done through an initial analysis which can help with later detailed analysis. Largely, it consists of close readings of transcripts. Initial analysis can also reveal gaps in data collection that could prompt action to collect further data.
4. Memoing the data: the annotation of notes on elements of the data, as ideas for its analysis suggest themselves to the researcher. These are initial reflections on the data by researchers, indicating potential emergent interpretations. Such memos may help

in further analysis., or may be merged or discarded in the emergent process of sensemaking of the data

5. Coding the data in phases. In phase 1 the researcher tries to assign codes to the entire dataset. This is an attempt to reduce the size of the data collected by noting statements, experiences and reflections that can be analysed further. In the second phase researchers revisit the passages and statements they have assigned codes to in order to generate higher-level codes related to the focus of the study. In the third phase, researchers attempt to make explicit connections between the codes and the research projects' conceptual and theoretical ideas. These may be a priori hypotheses of variable systematization, ranging from sensitizing implicitly held concepts to formal hypotheses; the latter are somewhat distant from the conventions of grounded theory. Doing this kind of reasoning normally leads to the highest level of inference.
6. Moving from codes to categories and then categories and themes. In this phase the researchers try to interpret how the codes relate to or contrast with each other. Codes are aggregated into categories that are analytically and conceptually related. Doing this precedes producing themes. To do this, researchers try to understand similarities, differences and relationships between categories to assign themes to sets of categories. The themes are expected to be inclusive of all underlying categories and descriptive of their content, relations between the categories and responsive to similarities or differences. Themes also consider the conceptual or analytical goals of the study to answer the research questions.

It is important to make the analytic process transparent when reporting qualitative research in papers. The information about the analytic process should be presented in a verifiable manner; essentially the theorizing should flow from premises that are clearly founded, through steps all can follow, to conclusions that follow, given the preceding analysis. An

analysis of qualitative research papers in strategic management shows that transparency is not followed well, with audit trails often not being provided (Auginis & Solarino 2019)

Template methods

Waring and Wainwright (2008) observed that business and management research has seen a rapid increase in the use of qualitative methods that require analysis of large quantities of textual data. However, in the past this has often led to unstructured ways of analysing data, resulting in criticisms that the findings from such research are 'insubstantial and unworthy of consideration' (p. 85). Template analysis methods provide structured approaches to analysing and interpreting qualitative data, using approaches such as grounded theory. King (2013, p. 426) explains that 'template analysis is a style of thematic analysis that balances a relatively higher degree of structure in the process of analysing textual data with the flexibility to adapt it to the needs of a particular study' (p. 426). King found that template analysis is preferred by qualitative researchers who find grounded theory methods suggested by Corbin and Strauss (2014) and Charmaz (2014) too prescriptive. Two approaches to doing and writing qualitative research in strategy and management using templates are shown in Table 1, based on Langley and Abdallah (2011, p.205). One of the templates is based on a post-positivist epistemology to 'develop nomothetic theoretical propositions' (p.201) while the other is more interpretive to gain 'insights into organizational phenomenon' (p. 201). These are:

1. The Eisenhardt method to develop credible novel nomothetic theory for case comparisons.
2. The Gioia method used for interpretive modelling of informant understandings over time.

Table 1 – Comparison of two prominent template methods

Characteristics	**Eisenhardt method**	**Gioia method**
Key reference	Eisenhardt (1989a)	Gioia et al (2012)
Exemplar articles	Eisenhardt (1989 b); Brown & Eisenhardt (1997); Eisenhardt, Furr & Bingham (2010)	Gioia (2004); Gioia & Chittipedi (1991); Corely & Gioia (2004); Nag, Corley & Gioia (2007); Gioia et al. (2010)
Key methodological inspiration	Yin (2009) on Case Study Research; See also Miles & Huberman (1994)	Glaser & Strauss (1967) and Strauss & Corbin (1990) on grounded theory
Epistemological foundations and purposes	- Post-positivist assumptions - Purpose: developing theory from testable propositions - Search for facts (e.g., emphasis on courtroom-style interviewing) - Product: nomothetic theory	- Interpretive assumptions - Purpose: capturing and modelling of informant meanings - Search for informants' understanding of organizational events - Product: process model/novel concept
Logic of method	- Multiple cases (4-10) chosen to be sharply distinct on one key dimension (e.g., performance) - Interview data with diverse informants - Identify elements that distinguish high and low performing cases building on cross-case comparison - Validity and reliability from multiple researchers, triangulation of data	- Single or few cases chosen for revelatory potential and richness of data - Realtime interviews and observations - Build "data structure" by progressive abstraction starting with informant first codes and progressing to second-order themes and aggregate dimensions - Trustworthiness from insider/outsider roles, member checks, triangulation
Rhetoric of writing	*Establishing novelty:* Contrasting findings from previous research *Providing evidence:* Data presentation in two steps: (a) data tables; (b) narrative examples of high and low cases *Offering explanation:* Ask why for every proposition.	*Establishing the gap:* Show how this study fills a major gap *Distilling the essence:* Present the data structure emphasizing second-order themes and overarching dimensions *Elaborating the story:* Elaborate the model in two ways: (a) present the narrative

	Reasons offering building on data and literature *Integrating contribution:* Link separate propositions together to build theory	(b) additional quotes in tables *Reaffirm the contribution:* Return to opening gap to show novel insight
Examples of other authors using similar approaches	Zott & Huy (2007); Gilbert (2005); Maitlis (2005)	Maguire & Phillips (2008); Anand, Gardner & Morris (2007); Rindova et al. (2011); Harvey, Peterson & Anand (2014)

For this paper we used the Gioia methodology as suggested by the researcher with experience in strategic management in the team, even though it was a limited range of cases across two regions/nations for comparative reasons. The rationale was that this approach was better suited to exploratory research than would have been the production of hypotheses based on a thin body of prior literature on the topic in question. The relative paucity of richly qualitative project management research on PPM was the deciding factor. For the project management researchers in the team this was a new experience that also provided other benefits as explained further in this paper.

Methodology

Research questions

The overarching research question proposed for the research investigation was: *How do construction firms align their programs and portfolios of projects with strategy?* To answer this question specific empirical data collecting questions that were to be addressed were scoped as follows:

> RQ 1: What portfolio-level processes, tools and techniques are used by construction firms to align projects and programs with strategy?
>
> RQ 2: What portfolio-level processes, tools and techniques are used by construction firms to select, prioritize and adjust resourcing across projects and programs?
>
> RQ 3: How do construction firms select and prioritize their tender offers across the portfolio?

It was expected that RQ1 and RQ2 would provide insights into the extent to which portfolio-level practices are adopted in the construction sector. RQ3 was expected to consider the contextual practice of the construction industry's dependence on the flow of work being composed of projects awarded through tendering processes. Construction, as an industry, when conducted at scale on major infrastructure projects, is distinct from other more routinized industries.

The research was underpinned by a pragmatic philosophy and used a case study approach (Yin 2014) to collect data from prominent construction firms in Australia and the UK. It was proposed that two firms in Australia and two in the UK would be chosen using a purposeful sampling method. Once the case studies in the UK and Australia were completed the data

collected was to be analysed independently and then a data analysis workshop would be held in Sydney with the principal researchers to compare the findings and arrive at common themes. It was expected that the analysis would be carried out using NVIVO qualitative analysis software and an NVIVO expert would help with this. Following the data analysis workshop, interviews would be held with leading professional organizations in Australia and the UK to see to what extent the findings from the case studies aligned with what was considered general practice in the sector as a way of validating the findings. Once this phase of the study was completed a focus group with experts from the construction sector was planned to validate the themes already formulated. We also planned to invite experts from the industry sectors that have mature PPM practices, such as new product development and IT. It was expected that the focus groups would inform how PPM practices in the construction sector could be enhanced further.

COVID-19 considerably affected the original plans for the study in both Australia and the UK. While initial interviews started face-to-face as planned, they later had to be replaced by online interviews using Zoom. Another issue faced by the Australian team was that one of the major firms to be interviewed in Australia was not contactable after COVID-19 lockdowns as managers who had agreed to support the research had left the firm. While the researchers managed to find another firm, they had completed two interviews with this major firm (referred to as ORG E later). These were early days of using Zoom and the interview recordings were of poor quality. So, the team decided to abandon the interviews and wait for 'normality' to return. This did not happen as expected. Meanwhile, the Zoom software improved, with the team becoming more familiar with its use due to having had to move to online teaching. After a six-month delay, another suitable firm agreed to be interviewed.

While the Australian team was waiting for a second case the UK team managed to complete their research and publish a preliminary report from their findings (Smyth and Wu, 2021). The researchers in Australia also wanted to start disseminating the research using other means, as it was impossible to travel to conferences. The joint UK-Australian research team submitted a book chapter with preliminary findings from four of the case studies.

Once the last interview in Australia was completed it was decided to hold the data analysis workshop online to keep to the already extended schedule with the research funding body. The research team could not include the construction firms due to the need to preserve anonymity. Therefore, it was decided that the focus group would take the form of a consultation with PPM experts from other sectors where the findings from the research would be presented and discussed in light of best practices in PPM. The discussions from this consultation would be fed back to the case organisations to help improve their PPM practices, thus meeting the original intent of the study.

At the time of writing this paper the data analysis workshop in Sydney has just been concluded and the consultation with expert groups is planned for February 2022. It is expected that findings from that consultation could be presented at the EURAM 2022 conference in June.

Data Collection

A research protocol was developed for the researchers to use to collect data and also to apply for Human Research Ethics Approval before starting data collection. Prior to conducting the interview, prospective organisations were approached through email or phone and the purpose of the research explained. A participant information sheet required by the Human Research Ethics Approval was sent to the representative of the firms who agreed to be

interviewed. It was requested that the team would like to interview at least one senior manager who was involved in strategy formulation and dissemination and three other managers from different disciplines within the firm who were normally involved in decision making on portfolios or projects that the firms participated in. A consent form was signed at the interview by the interviewer and interviewee. Consent was sought to record the interview and the recording was then done with the researcher taking additional notes. As far as practical two researchers from the research team were present at both face-to-face and online interviews. The recording was transcribed by a professional transcribing firm and verified by one of the researchers present at the interview. A pilot interview was also held in Sydney with a prominent construction firm to test the questionnaire before the full fieldwork began.

The research protocol designed covered the following aspects:

1. The organisation, strategy and challenges to check what distinguishes the firm from others in the industry.
2. Strategy and leadership: To understand what processes were used to develop the firm's strategies and how widespread the understanding of the strategy was within the firm. Whether the strategies planned changed or evolved or refreshed. How was strategy communicated?
3. Success and value creation: To review whether the business model of the organizations in the case study was explicit or implicit in the strategic thinking. What were the indicators of its value? How did the value created differ between projects? How did the organization measure success?
4. Resource base: To check the extent to which the organisations had rare skills and capabilities that differentiate them. What processes were used to develop these

capabilities? How did they hire, develop and retain valuable skills? Did they outsource capabilities that were needed if they did not have them inhouse?

5. Project origination, tendering and the project management environment: Types of projects undertaken by the firm. How did projects originate and how did they link to their strategy? Existence of project management offices. How were projects formalised and managed?
6. Portfolio-level strategic oversight or procedures: Were there project portfolio processes and, if so, how were projects in a portfolio assessed to be grouped? Were projects grouped into programs when needed? How were high-level decisions made and how did the firm's strategy inform these decisions? How far in the future did they plan the pipeline of their projects to be tendered to? Detailed questions were asked about the existence of portfolio processes and use of visualisation to make interdependencies visible to aid decision making. How flexibly did the organisation respond to changes in the environment? Was a portfolio approach established and did it change over time?
7. Perception of what works and what could be changed: This was to gauge the satisfaction of the firm in the current ways in which its projects or programs were aligned with its strategy. Were methods for multi-project oversight widely understood within the firm? Challenges faced by the organisation to succeed.
8. While closing the interview the informant was asked if anything else came to mind regarding the topics discussed.

Where two researchers were involved, in collecting the data, they shared the questions based on their speciality. A NVIVO file was created by the Australian research team with codes based on the research questions and iterative reflections from undertaking the interviews. However, a manual process was used to create the Gioia data structures as time became an issue to complete the NVIVO analysis before the planned data analysis workshop.

The three Australian organizations that were used as case studies are shown in Table 2

Table 2 – Australian case studies

Case Codes	Brief Description	No of interviews
ORG A	Tier 1 Contractor (Infrastructure projects)	4
ORG B	Construction Project Consultancy	4
ORG E	Property developer, builder and asset manager	2

Initially it was felt that the case study of ORG E was incomplete but after reading the transcripts for the Gioia analysis it was found that there was sufficient data to create a comparable data structure.

The two UK case studies were as shown in Table 3

Table 3 – UK case studies

Case Codes	Brief Description	No. of interviews
ORG C	Tier 1 Contractor with consultancy capabilities	8
ORG D	Tier 1 Contractor	8

In total five interviews were held with advisers and representatives of industry bodies, one in Australia and four in the UK. Due to Covid related issues the second interview could not be completed in Australia. The findings from these interviews will be used in the expert consultation group planned in February 2022. The data analysis presented in this paper is based on the three Australian case studies. However, insights from the UK cases were added to the data analysis presented at the data analysis workshop.

Visualization

Discussing the role of visual data in sociological research, Swedberg (2016) identified three ways in which to use visual data for theorizing. Successive visual sketches constituted preliminary abductive steps in a process of theorizing. The second of these is relevant to the present study, where successive visual sketches constitute preliminary attempts as deductive steps in a process of theorizing. Visual representations can generate novel theories. Inductively. Ravasi (2017, p. 243) suggests that visualizing qualitative data assists the coding and theory building process in moving from qualitative data to analysis. Parmentier-Cajaiba and Cajaiba-Santana (2020) argue that visual mapping allows enhanced engagement by researchers with the data as they select, remove or add elements, seeing visualization as an essential stage in developing theorizing.

Visualizations are more than mere representations; they have narrative power (Kassinis & Panayiotou, 2018) and embed knowledge (Ewenstein & Whyte, 2009), bringing new meaning to existing forms of understanding. While visualization can be used in a formulaic way, narrowing down thinking with 2 x 2 templates that are conducive to inflexible simplification of reality (Pratt, Sonenshein, & Feldman, 2020), when used processually, as cues for theorizing, they can become key boundary objects, as we will explore. Visualizations loosen 'convention or preconceived notions of linear cause and effect' (Langley & Ravasi, 2019, p. 188) in theorizing from data analysis.

Data Analysis

A three-column method (Gilbrich 2007) was used to start coding the interviews. A table for coding the interview data was set up with the transcript in the middle and two blank columns, one on the left for reflections of the researcher and a one on the right to develop phase 1

coding. Figure 1 shows a page from the analysis. Six coloured marker pens were used to highlight quotes related to specific aspect of the research being investigated. The colours used were as shown in Table 4.

Table 4: Colours used to highlight quotes for codes

Colour	**Quote relating to research topic**
Yellow	Strategy/Communication of Strategy
Orange	Value
Blue	Capability
Purple	Portfolio Management/Visualisation
Green	Success
Pink	Decision making

Figure 1 shows a sample of the data analysis using the three columns

Insert Figure 1 about here

After reading through the transcribed interviews, a Gioia data structure was created for each organisation in Sydney. The reason different data structures were created for each case was because the organizations interviewed had different lines of business in the construction sector.

ORG A's focus is in the infrastructure sector as a Tier 1 contractor. ORG B is a reputed project management consultancy whose business provides expert advice through the project life cycle. ORG B does work in the infrastructure sector, providing support for project controls on behalf of the client. ORG E is a major player in the construction, contracting and

asset management sector serving multiple sectors that had recently decided not to compete in the infrastructure sector.

We started the process as per Gioia, Corley and Hamilton (2012). They explain that in organisation studies the focus is more on concepts than constructs as 'concepts are precursors to constructs in making sense of organizational worlds' (p. 16) and concepts are necessary for theory building that 'can then guide the creation and validation of constructs' (p.16). Therefore, the first step taken in the analysis was to identify first-order concepts from the codes developed during phase 1 to reduce the number of codes to concepts. It is similar to axial coding from open coding in grounded theory (Strauss & Corbin 1990). See Figure 2 for an example of this first step.

Insert Figure 2 about here

The items under the column showing first-order concepts on the right were compiled together from coding of the various interviews with representatives of ORG B. These represent the voice of the informants at a higher level of abstraction.

Some attempt was made to identify the second-order theme shown in the middle but this was subject to further refinement at the data analysis workshop, in which 'knowledgeable people' (experts in different areas such as strategy, portfolio management and construction management) could 'figure out patterns in the data enabling us to surface concepts and relationships that might escape the awareness of the informants, and that we can formulate these concepts into theoretically relevant terms' (Gioia et al 2012, p. 17). However, the researcher who created Analysis 1 also added a column called Research Focus on the left, to retain focus on the research questions asked. In addition, while assembling first-order concepts, the replies from informants were colour coded depending on the area of research

they contributed to, even though the question might have been focused on another area. For example, while a question on ‘strategy’ was asked, replies from the informant could allude to a response relevant to ‘portfolio’. If you look at Figure 1 you can find that sentences in the same reply were colour coded according to a variety of research foci.

To explain how the first-order concepts were developed, Figure 3 shows a sample of quotes from the transcripts that led to the suggested themes. The responses from four of the respondents in ORG B were abstracted to the second-order theme ‘Opportunistic, based on economic cycle’ under the general research focus ‘strategy’.

Insert Figure 3 about here

The analysis of the three Australian case studies was distributed to the research team in Australia and the UK prior to the data analysis workshop, triggering a response from the UK research team to add their own insights to the data structures from their case studies. This was refined further after the Gioia data structure was presented to all the researchers on Day 2 of the data analysis workshop. This progressive elaboration of the findings is shown in Figure 4 for ORG E.

Insert Figure 4 about here

After the workshop one of the other researchers refined the 2nd order themes. Figure 5 shows Analysis 3 of ORG A where the researcher refined the second-order themes.

Insert Figure 5 about here

The discussions during the data analysis added to a clearer understanding of how construction firms were approaching their own version of portfolio management, which was described as a ‘coping strategy’ by the strategy expert from the team.

Findings

The Gioia data structures served to trigger several discussions to consider future research outputs from the research that were not planned at the start of the study. This happened during the second day of the data analysis workshop. Some of these explorations are now presented. A member of the research teams conceptualised the differences between traditional PPM processes with what appeared to be processes adapted by construction firms as shown in Figure 6 that also acted as a 'visual object' that triggered further discussions. Researcher 2, who had provided Figure 6, used this visualisation to explain why traditional portfolio management processes were not being followed by construction firms. This developed into a discussion on what construction firms do differently with their projects compared with organizations that undertake projects as part of their project portfolio strategy.

Insert Figure 6 about here

Researcher 2 explained his visualisation by adding that,

'Now that can't happen when you've got a contract that you are delivering benefits to someone outside the organisation. So, in construction, we won't see that divestment. […] Yeah. It's a difficult thing for a construction contractor to do. So, you do have this portfolio or a project, but you are not able to manage it in the classic way. So, what does that mean? You know, how does that change the way in which you approach things? And then I was also struck by the fact that we are hearing a lot about repeat business. And it's all about having that record of delivering for a client and being able to get more business from that same client. And that's how they survive.'

Researcher 1 then responded

'*I think that was interesting that you highlighted that because it's not something I had tweaked to until I saw your diagram, I'm like, okay, we've got these stages of the process where normally there's some portfolio re-evaluation and potential for adjustment and those are important decisions and those might be happening at a periodic time. But most of that is closed off, probably all of it, really, because of contractual agreements.'*

Researcher 1 further elaborated that

'And it's interesting to me that from construction, it's all about, ... where and how are we going to bid and then you [are] kind of [at] the mercy of something outside of whether or not you get the project, then you rethink about what else you're going for. But […] really, those bidding decisions are even more important than they are in other project environments.'

The second important discussion was how capability and resources played a major role in selecting and bidding for projects

Researcher 4 wondered:

'How do organisations with resource-based capabilities get to be parlayed into projects?' And why you would choose projects to ensure that your fixed assets were at least making a return on their investment because they were being used. But it's a more intriguing prospect to think about your dynamic capabilities as fixed assets that you ensure are making a return. So, let's go back to the discussion yesterday. I understand that if you see what you have that's valuable, rare, and inimitable, and not as barges, tunnels, boring machines and something else ... then you can see why you might bid for a job on a very tight margin, because: a) you would assume you'd be able to claw some of it back during the process and b), it at least means that your assets are making a return on the capital that you've got invested in them.

So, I mean, do companies work the same way with the employees, the HR assets that they have?'

Researcher 3 then suggested that

'A paper on capabilities is a great idea […] I think largely looking at management capabilities that they actually don't invest in these outside the project. So, a program management level was not very much developed, you know, even if they developed capabilities on a project, say a long project, it doesn't necessarily get transferred to another project because they don't have an effective capability for organisational learning and knowledge management.'

The discussion on capabilities continued and this led to a discussion on how construction firms were focused on a pipeline of projects. This discussion was triggered by Researcher 4, who had previously conducted research with a major Australian construction firm.

'One of the things that came through really clearly [with] the industry experts … one of the things that most concerned them was pipeline. They really wanted to see and to know what the pipeline was. And of course, that's a real coping strategy, you know, but it's a coping strategy where you're actually dependent on the politics because most of these things are kicked off by governments, well, at least in New South Wales, they are government funded. You're relying on the politicians to deliver the pipeline so that was a really major consideration … So I think that's an interesting point that we could look at as one of the coping strategies or one of the strategies for coping with the uncertainty of the project environment in which they're operating.'

Researcher 1 elaborated the idea further

'One is, you know, being in touch with all the big government and big developers about their pipeline. Yeah. And that's like 20 years of potential projects and then managing their own pipeline, they go together.'

The discussion on capability then led to the idea of looking at how clients were managed by construction firms.

Researcher 3 suggested

'I think there's something there around one particular capability, which was very wrong in both the UK cases and that's client management. Yeah. Pipelines, repeat business, client management. And I think that could be a paper'

Further discussions confirmed that a research output focused on client management pipelines and how this leads to repeat business could be developed as these were prominent in the data analysed so far. While further discussions led to other possible outputs the data presented so far demonstrates the use of Gioia structures as a visible object triggering interdisciplinary collaboration. After the workshop was completed the Gioia data structures were reviewed by the research team to develop the full structure, including first order concepts, second order themes and aggregate dimension. Figures 7, 8 and 9 show the developing Gioia data structures for the three case studies that will be worked on further. This will then be refined after the EURAM conference to be submitted to a project management journal.

Insert Figures 7 to 9 here

Conclusions

Nicolini, et al. (2012) observed that several 'social theorists have argued, moreover that a characteristic feature of modern sociality is that it is increasingly mediated by objects and

material artifacts' (Knorr Cetina 1997)' (p. 612). It is clear from what has been discussed so far that the visible materiality of the Gioia modelling acted as a *visual object or artefact* whose impact went beyond expectations of what the data analysis workshop could deliver.

In their analysis of the role of objects in cross-disciplinary collaboration Nicolini, et al. (2012) proposed a framework (p. 625) in which they considered objects as primary, secondary and tertiary. The use of Gioia data structures would fall under secondary objects of collaboration within their framework. The main function of such an object is to 'facilitate work across different types of boundaries' (p. 625) and they use visual slides and shared analytical methods as examples. The Gioia data structures represented an analytical and visual method to make sense of findings from the case studies. Given that the workshop was held online and the visuals were on screen in the vision of each participant in the workshop, the impact of the visualizations was heightened as there were no competing distractions in the environment. According to Nicolini, et al. (2012), the theoretical approach to analysing this collaboration is to view the visualizations as 'boundary objects.'

With this research account of the research process, we have sought to reveal the research process in action and to demonstrate not well-honed and elegant models that resulted from a research process but instead to show how the process of producing such models unfolded. Doing research projects is a process of unfolding temporality just as construction projects inherently emergent and temporary in execution; in researching the latter we have sought with this paper to lift the veil of the finished and accomplished façade to reveal the infrastructure works underlying the structure.

References

Aguinis, H., & Solarino, A. M. (2019). Transparency and replicability in qualitative research: The case of interviews with elite informants. *Strategic Management Journal*, *40*(8), 1291-1315.

Anand, N., Gardner, H., & Morris, T. (2007). Knowledge-based innovation: Emergence and embedding of new practice areas in management consulting firms. *Academy of Management Journal*, *50*(2), 406–428.

Archer, N., & Ghasemzadeh, F. (2007). Project portfolio selection and management. In Morris, P. & Pinto, JK (Eds.), *The Wiley Guide to Project, Program & Portfolio Management*, (pp. 94-112), J. Wiley &Sons.

Arsanjani, M. A., & Ershadi, M. (2021). Avenues to improving the effectiveness of project portfolio management in the construction industry. *International Journal of Management Science and Engineering Management*, https://doi.org/10.1080/17509653.2021.2009053

Brown, S. L., & Eisenhardt, K. M. (1997). The art of continuous change: Linking complexity theory and time-paced evolution in relentlessly shifting organizations. *Administrative Science Quarterly*, *42*(1), 1–34.

Charmaz, K. (2014). *Constructing grounded theory*. (2nd. ed.), SAGE.

Cooper, R., Edgett, S., & Kleinschmidt, E. (2001). Portfolio management for new product development: results of an industry practices study. *R&D Management*, *31*(4), 361-380.

Corbin, J., & Strauss, A. (2014). *Basics of qualitative research: Techniques and procedures for developing grounded theory*. SAGE.

Corley, K. G. (2004). Defined by our strategy or our culture? Hierarchical differences in perceptions of organizational identity and change. *Human Relations*, *57*(9), 1145–1177

Csendes, I. (2018): Implementing Project Portfolio Management in a Commercial Bank. In Brătianu, C., Zbuchea, A., and Vitelar, A. (Eds.) *Strategica. Challenging the Status Quo in Management and Economics*. Bucharest: Tritonic, 1143-1152

Daniel, E. M., Ward, J. M., & Franken, A. (2014). A dynamic capabilities perspective of IS project portfolio management. *The Journal of Strategic Information Systems*, *23*(2), 95-111.

Davies, A., & Frederiksen, L. (2010). Project-based innovation: The world after Woodward. In Nelson, X. et al. (Eds.) *Technology and Organization: Essays in Honour of Joan Woodward*, (pp. 177-215), Emerald Group Publishing Limited.

Eisenhardt, K. M. (1989a). Building theories from case study research. *Academy of Management Review*, *14*(4), 532–550.

Eisenhardt, K. M. (1989b). Making fast strategic decisions in high velocity environments. *Academy of Management Journal*, *32*(4), 543–576.

Eisenhardt, K. M., Furr, N. R., & Bingham, C. B. (2010). CROSSROADS—Microfoundations of performance: Balancing efficiency and flexibility in dynamic environments. *Organization science*, *21*(6), 1263-1273.

Ewenstein, B., & Whyte, J. (2009). Knowledge practices in design: the role of visual representations as epistemic objects, *Organization studies*, *30*(1), 07-30.

Gilbert, C. G. (2005). Unbundling the structure of inertia: Resources versus routine rigidity. *Academy of Management Journal*, *48*(5), 741–763.

Gilbrich, C (2007). *Qualitative data analysis: An introduction*. SAGE.

Gioia, D. A. (2004). A renaissance self: Prompting personal and professional revitalization. In: R. E. Stablein & P. J. Frost (Eds), *Renewing research practice* (pp. 97–114). Stanford University Press.

Gioia, D. A., & Chittipeddi, K. (1991). Sensemaking and sensegiving in strategic change initiation. *Strategic Management Journal*, *12*(6), 433–448.

Gioia, D. A., Price, K. N., Hamilton, A. L., & Thomas, J. B. (2010). Forging an identity: An insider-outsider study of processes involved in the formation of organizational identity. *Administrative Science Quarterly*, *55*(1), 1–46.

Gioia, D.A., Corley, G. & Hamilton, A.L. (2012). Seeking qualitative rigor in inductive research: Notes on the Gioia methodology, *Organizational Research Methods*, *16*(1), 15-31.

Glaser, B. G., & Strauss, A. L. (1967). *The discovery of grounded theory*. Aldine.

Guo, N., & Yu, S. W. (2013). The necessity of project portfolio management in the construction industry of China mainland. In *Applied Mechanics and Materials*, *357*, 2238-2241.

Harvey, S., Peterson, R. S., & Anand, N. (2014). The process of team boundary spanning in multi-organizational contexts. *Small Group Research*, *45*(5), 506-538

Kassinis, G., & Panayiotou, A. (2018). Visuality as greenwashing: The case of BP and Deepwater Horizon. *Organization & Environment*, *31*(1), 25-47.

Killen, C. P., & Hunt, R. A. (2013). Robust project portfolio management: capability evolution and maturity. *International Journal of Managing Projects in Business*, *6*(1, 131-151.

Killen, C. P., Hunt, R. A., & Kleinschmidt, E. J. (2008). Project portfolio management for product innovation. *International Journal of Quality & Reliability Management*, *25*(1), 24-38.

King, N. (2013) Doing template analysis, in Symon, G. & Cassell, C. (Eds) *Qualitative Organizational Research*, (pp. 426-451), SAGE.

Langley, & Abdallah, C. (2011). Templates and Turns in Qualitative Studies of Strategy and Management. In *Building Methodological Bridges* (Vol. 6, pp. 201–235). Emerald Group Publishing Limited.

Langley, A., & Ravasi, D. (2019). Visual artifacts as tools for analysis and theorizing. In Zilber, T. B., Amis, J. M & Mair, J. (eds) *The Production of Managerial Knowledge and Organizational Theory: New Approaches to Writing, Producing and Consuming Theory*, (pp. 173-200), Emerald Publishing Limited.

Lester, J.N., Cho, Y. & Lochmiller, C.R. (2019). Learning to do qualitative analysis, *Human Resource Development Review*, *19*(1), 94-106.

Maguire, S., & Phillips, N. (2008). 'Citibankers' at Citigroup: A study of the loss of institutional trust after a merger. *Journal of Management Studies*, *45*(2), 372–401.

Maitlis, S. (2005). The social processes of organizational sensemaking. *Academy of Management Journal*, *48*(1), 21–49.

Martinsuo. M. (2013). Project portfolio management in practice and in context. *International Journal of Project Management*, *31*(6), 794–803.

Miles, M. B., & Huberman, A. M. (1994*). Qualitative data analysis*. SAGE.

MoP (2011), *Management of portfolios*, Axelos global best practice, TSO.

Nag, R., Corley, K.G. and Gioia, D.A., 2007. The intersection of organizational identity, knowledge, and practice: Attempting strategic change via knowledge grafting. *Academy of Management Journal*, *50*(4), 821-847.

Nicolini, Mengis, J., & Swan, J. (2012). Understanding the role of objects in cross-disciplinary collaboration. *Organization* Science, *23*(3), 612–629.

Parmentier-Cajaiba, A., & Cajaiba-Santana, G. (2020). Visual Maps for Process Research: Displaying the Invisible. *M@n@gement*, *23*(4), 65-79.

Pennypacker, J. S. (2005). *Project Portfolio Management Maturity Model*. Center for Business Practices.

PMI (2013). *The standard for portfolio management*, 3rd edn., Project Management Institute.

Pratt, M. G., Sonenshein, S., & Feldman, M. S. (2020). Moving beyond templates: A bricolage approach to conducting trustworthy qualitative research. *Organizational Research Methods*, 1094428120927466.

Rindova, V., Dalpiaz, E., & Ravasi, R. (2011). A cultural quest: A study of organizational use of new cultural resources in strategy formation. *Organization Science*, *22*(2), 413–431.

Smyth, H. J. and Morris, P. W. G. (2007) An epistemological evaluation of research into projects and their management: methodological issues, *International Journal of Project Management*, *25*(4), 423-436.

Smyth, H.J. and Wu, Y. (2021) *Practice-based Study of Strategic Project Portfolio Management in the UK Construction Sector*, Available at: https://www.ucl.ac.uk/bartlett/construction/news/2021/oct/practice-based-study-strategic-project-portfolio-management-uk-construction-sector

Strauss, A., & Corbin, J. (1990). *Basics of qualitative research*. SAGE.

Swedberg, R. (2016). Before theory comes theorizing or how to make social science more interesting. *The British journal of sociology*, *67*(1), 5-22.

Waring, T. & Wainwright, D. (2008). Issues and Challenges in the Use of Template Analysis: Two Comparative Case Studies from the Field. *The Electronic Journal of Business Research Methods*, *6*(1), 85-94.

Wu, Y., Zhang, H., & Xu, H. (2016). A Three-Dimensional Project Portfolio Management Framework for Construction Companies. *The Open Civil Engineering Journal*, *10*(1), 433-447.

Yin, R. K. (2009). *Case Study Research*: *Design and Methods*, (4th ed.). SAGE.

Yin, R.K. (2014). *Case Study Research*: *Design and Methods*, (5th ed.). SAGE.

Zott, C., & Huy, Q. N. (2007). How entrepreneurs use symbolic management to acquire resources. *Administrative Science Quarterly*, *52*(1), 70–105.

Figure 1 Example of coding from a transcript

Reflections	Transcript ORG B (Consultancy Firm) Interview A4	Coding
	Q: How do the firms projects originate, where do they come from?	
Focus on repeat business though delivering value	A: So 90% of our business is repeat business, so been around for 55 years, people know you, you're the only ones who can do this etc., so we're pretty proud of that and we work hard to keep our relationships with our clients. We do do some covert tendering that we see, generally it doesn't do a real lot. We also look to as I said before, in terms of the alliances that we look too to do and sort of form a coalition to pursue a specific opportunity that we're aware of and that might be more of a public tendering type thing. But a lot of it is simply I used you guys last time; we need you again. The other I guess key thing that we do is that we are making sure that people know who we are, that's a very sort of – we realise there might not be any business here today, we're a long term business, we want you to know that here's our skillset, here's our pedigree, we've got some great projects that we've done over the years, when you have a problem please give us a call and let's have a chat.	Customer retention as strategy and indicator of value Deliver value to clients to secure repeat business. Build the reputation "we deliver"
	Q: Would the 90% still be relevant to projects that you've strategically chosen to do?	
	A: In terms of the projects that we choose to do, we're probably – we do try to keep a balance I guess, so when someone comes to us and says we'd like you to work with us, we would look at it and based on the commerciality of it we would say yeah okay we've got the resources we've got the skills etc., we would probably take it on; the only real question is whether we are doing – we try to work on the government side - so XXXXXX for example, we're working for the government, that stops us from working for the XXX's or XXXX's and John Holland's etc., so we can't – (Yellow/Pink)we've got to choose which side of the fence we sit on and that's about as strategic as we get in terms of will we take this job or won't we take this job (Yellow/Pink) Strategically if we said – I use a defence as an example, we see opportunities coming in future, we would deliberately be out there pushing our name out there and saying hey, have you heard of XXX, Brigadier General blah, blah and making sure that people knew us in that sector and then we'd certainly pursue and price work in that sector if we wanted to make sure that we had, want to create a name for ourselves in that …-	Portfolio selection and decision making? Strategy to work on only one side of a contract for ethical reasons. Choosing ideas as a strategy and portfolio selection

Figure 2: Analysis 1 Org B (PM Consultant)

Research Focus	2nd order theme	1st order concept
Strategy (1)	Opportunistic based on economic cycle	• Opportunistic based on economic cycle • Look for opportunities across life cycle of a project irrespective of sectors (Agility) • Invest in anticipation of specific market despite long gestation period (Stars in BCG?)
Strategy (2)	Competency- based strategy	• Niche focus based on capability (Strength based) • Project delivery experts for large complex high-risk projects (Known in the market for) • 'Eyes on the project' for customer (Providing expertise) • Take on new partners to build a business • Good at trouble shooting and problem solving • Resource based strategy
Strategy (3)	Establishing a niche in the market	• Differentiation from Big 4 consultants to find a blue ocean for niche services • Not based on power points and impressive presentations but by demonstrating outcomes • Positioning themselves at the analytical end of the market (sausage in the hot dog) • Stay small but be specialised
Strategy (4)	Creating a stable market	• Getting business repeatedly for major share of the business (Cash Cow) • 90% business is repeat business
Strategy (5) Communicating	Hierarchical	• Dissemination through road shows by CEO • Using formal meetings • Only on need-to-know basis
Value	Delivering value	• Establishing project controls in organizations that need them • Gauged through repeat business • Social responsibility and teamwork • Through saving money for the customer and providing good advice • Maintain reputation through quality of work
Capability (1)	Dynamic capability	• Diverse skill set • Mobile resources (Adaptability) • Quick build-up of capability to meet new needs • Technical and contractual understanding
Capability (2)	Capability development	• Identifying areas of concern from staff (open to ideas) • Solving problems together • Securing good talent and looking after their growth (introverted paying attention to detail) • Everyone has a mentor • Job rotation to work with opportunities to work with directors

Portfolio Management (1) **Buckets**	Mix of sectors, organizations and services	• Some large clients with long gestation period • Based on expert project management services over life cycle to different sectors • Choosing the side to work on in a project • Based on types of services specialised in offered to any sector • Based on business segment of responsible directors
Portfolio Management (2) **Prioritization?**	Portfolio Selection	• Stay away from businesses due to ethical concerns • Avoid those that are not beneficial to business • Fulfils resource utilisation • Based on Q-A form (lessons learnt?) • Bread and butter and major sectors that have opportunities • Allocation by pipeline of directors and their expertise
Success	Client focused	• Delivering what the client asked for • Establishing close relationships • Keeping a client happy • Clients coming back for repeat business • First choice to come back to
Decision Making	Top Down?	• Sign off on major decisions by directors • Decision on which markets to enter

Figure 3: Analysis 1 Org B (PM Consultant)

Research Focus (2nd order theme)	Interview responses that were abstracted to 2nd order theme
Strategy 1 (Opportunistic based on economic cycle)	'We I guess work across the project life cycle, so the economic life cycle at the moment for example, everyoneís building roads and railways and all those sorts of things, airports, so everyoneís in a building phase. But thereís also I guess you know, where it all starts to slow down and people start to go after each other in court and sort of try to recover damages from delayed projects and variations and those sorts of things; so we work across that life cycle and provide services, whatever the economy is doing and by operating in different geographies and in different industries' (P4) 'It ís a rolling strategy and we're very opportunistic' (P4) 'we can see from our network that there ís going to be a boom in infrastructure or there ís going to be a boom in defence projects or renewable energy and those sorts of things; so we've positioned ourselves' (P 4) 'the defence market is a great example of that, where we're putting a lot of investment into that and it ís one of those strategic investments that we chose to make, appeared from a strategy about two or three years ago, we've made specific investments to build a presence there; but it ís a very slow burn type market, there ís a two hundred billion dollar pipeline of defence produce and we think we'd be well suited to that, but it might be another two or three years before you see anything from that' (P4) 'we have been in project business for 55 years, we know the basics in terms of what needs to be done in order to deliver projects and I guess the things that tend to go wrong over those periods' (P4) 'So in terms of our broad strategy we said that we wanted to set up our business in the Middle East and we said that twelve months ago, we still have that business there' (P4) 'Three years ago we said we wanted to do defence; we've achieved that' (P4) 'you're sort of servicing as the project goes along, on the program scheduling side and sort of the planning side, it's like as that dies down the claims go up, so sort' (P1) 'the services, so where you might get a load of rail claims in one year, or a load of rail work in one year might be something else, … somewhere else if you like … so.' (P1) 'So I think six months ago a bit of noise was made by the Australian government looking to sort of invest in a bit of a space program and so we sort of … up at that and said anyone with aerial experience and so one of our associates started looking into that. It wasn't so much as a drive to get work there but just sort of assess the viability of Australia, even establishing a space program and how we might offer our services in that area.' (P2)

Figure 4 Analysis 2 Org E (Builder and Asset Manager) – Inputs from UK researcher

Strong alignment with UK findings xxxxx
Unaligned with UK findings xxxxx
My comments xxxxx

Research Focus	2nd order theme	1st order concept
Strategy (1)	Reliable partner	• Safe pair of hands providing value for money to deliver complex projects, for both yet especially one of the UK cases, CC2 • Being honest and transparent upfront and deliver what is promised • Have the difficult conversations upfront • Provide solutions at remote locations to win credibility • Business arrangements based on credibility rather than tender, especially the above UK case, CC2 • Established brand name
Strategy (2)	Leader in capability development	• Hiring people to meet demands of pipeline and fast track development • Keep reserve capability to take on projects as they come, move teams from existing project teams to new projects to hit the road running, yet risking discontinuity of service on existing projects – evidence not from this research
Strategy (3)	CSR	• Demonstrate social responsibility • Committed to work with partners who are keen on being a good citizen • Diversity of staff
Strategy (4) Communication	Top Down	• Road shows to communicate strategy – was popular in UK, e.g. XXXX but is waning a bit now. One case started a new round but it began to falter before Covid and then was ceased in Covid.
Value	Internal and external	• Getting repeat business for the firm • Keeping the value chain profitable and paid • Adding value to own people by providing good careers rhetoric rather than real substance. • Leaving a long-term legacy to communities • Maintain long-term relationships • Value to industry through capability
Capability (1)	VRIN	• Variety of resources including equipment, people at various levels • Well-developed internal systems •

Note: Only first page included as example

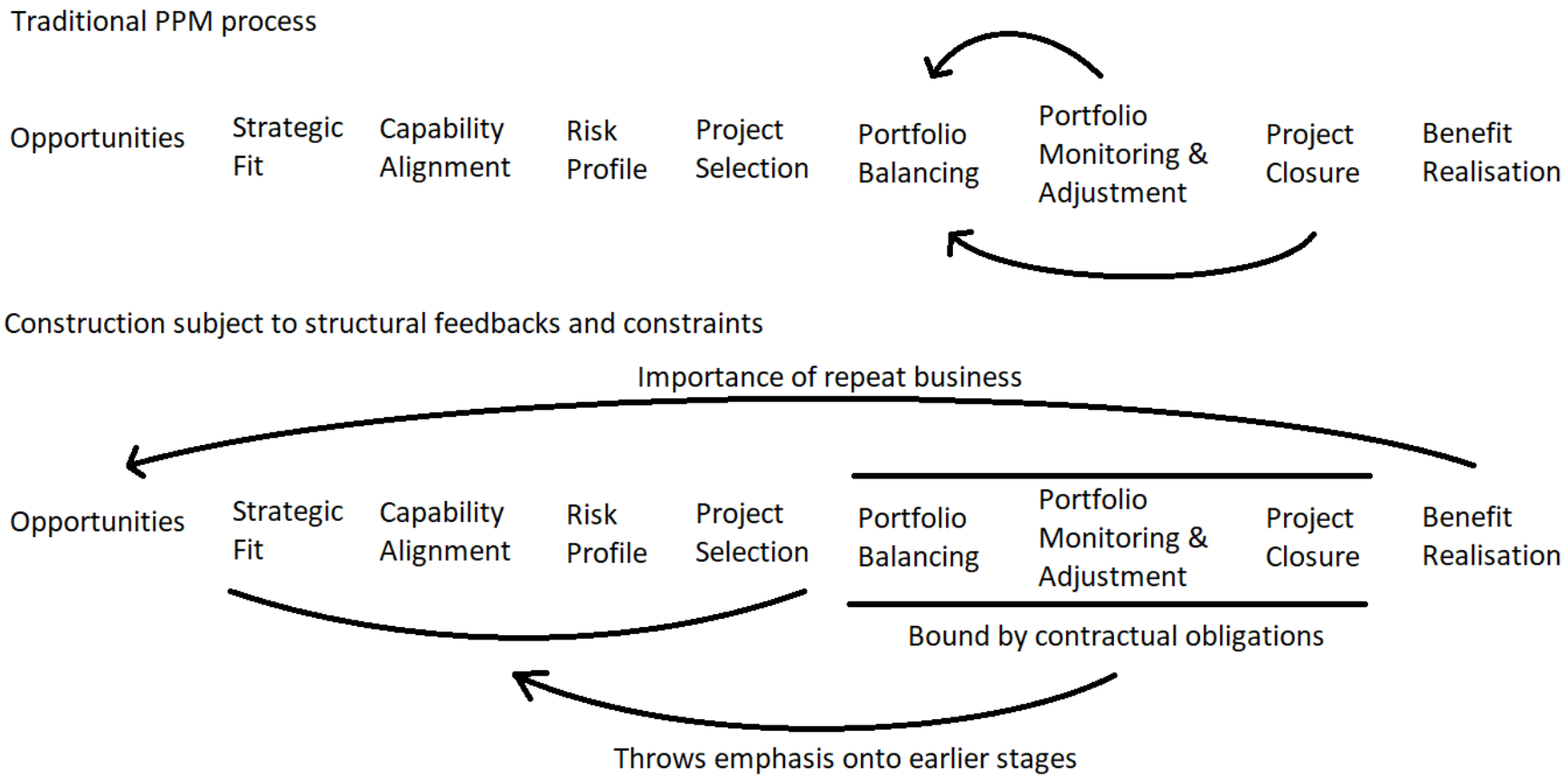
Figure 5 Analysis 3 Org A (Global Infrastructure Firm) – Inputs from Australian Expert

Strong alignment with UK findings xxxxx
Unaligned with UK findings xxxxx
My comments xxxxx
Researcher 1 ideas on higher order themes in Grey xxxx

Research Theme	Level 2	Level 1
Strategy (1)	Vertical and Horizontal Integration Evolving strategy – RBV – DC (extending resources)	• Delivering larger portion of a project with expertise in the value chain • Provide unmatched diversity among competitors • Insource rather than outsource • Acquire organisations strategically • Overcome restrictions in capacity building due to Covid by acquiring Lend Lease Engineering
Strategy (2)	Collaboration through alliances RBV? – networking (See discussion in email)	• Choose partners based on strategy for a location • Work with partners on specific aspects of work they are experts in (design), especially one UK case, CC2 have a specialist design division. • Collaborate to meet the demands of the market
Strategy (3)	Differentiation through specific capabilities RBV supporting competitive positioning (ties in with evolving strategy)	• Passion towards sustainability and environment), especially one UK case • Contributing to UN's sustainable development goals through green credentials • Competitive advantage in providing the right solution • Develop a reputation for delivering on commitments • Core leadership team provides connectivity
Strategy (4)	Serving a diverse market Evolving strategy	• Playing the infrastructure and renewable energy markets • Establishing a market in one sector to establish credibility and look for other markets (Infrastructure to water?) • Different types of projects in different states of Australia: applies to regions for one UK case, CC1.
Strategy (5)	Become a market leader Evolving strategy	• Aim to be a Tier 1 contractor • In heavy civil construction with tunnelling • On level with John Holland and CPB (Current Tier 1s)
Strategy (6)	Balance profit and social responsibility Value and Evolving strategy	• Sustainable profit and environmental outcomes • Best outcomes for the taxpayer using appropriate contracting strategy

Note: Only first page included as example

Figure 6 – Differences between traditional PPM and Construction PPM



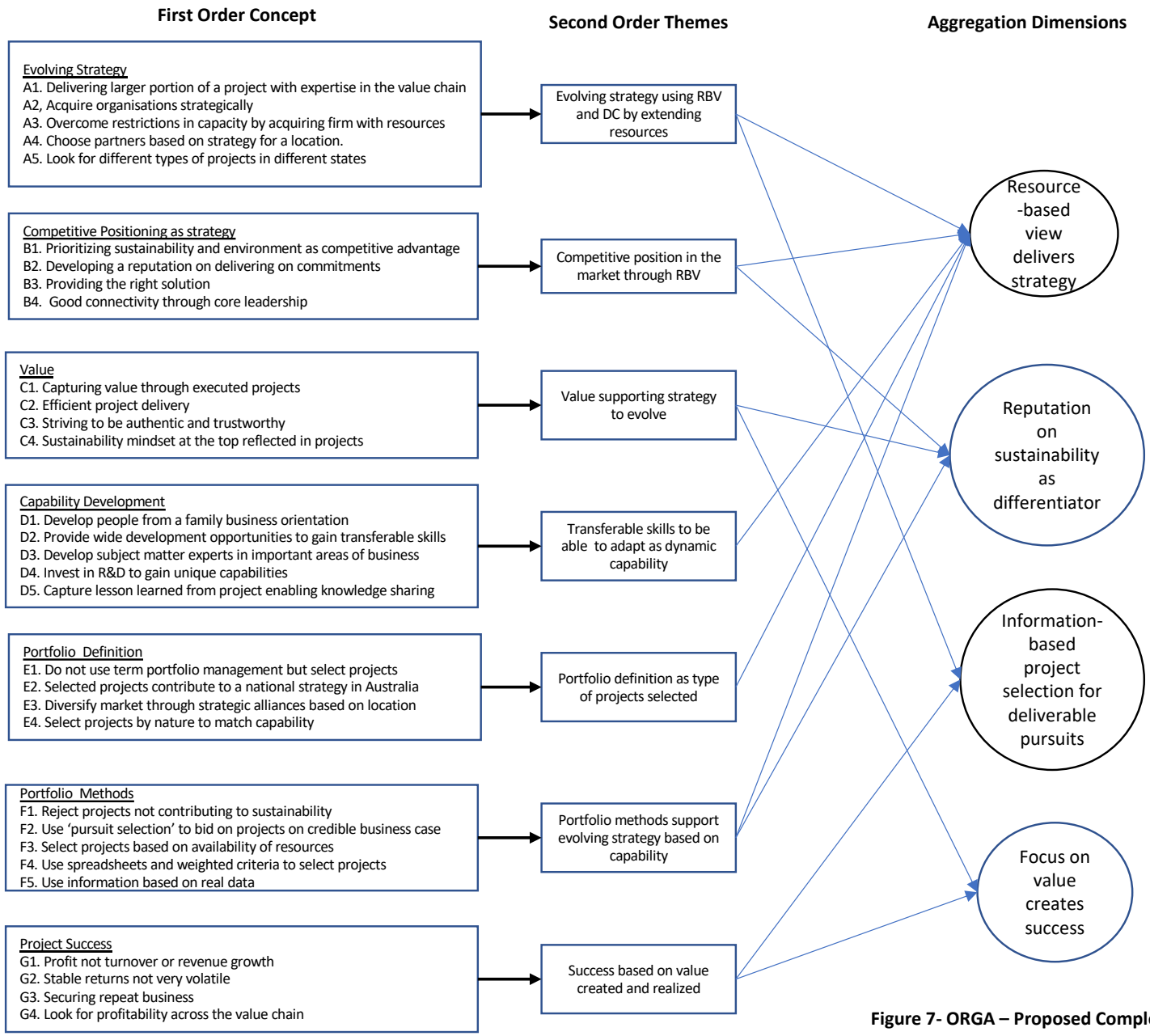


Figure 7- ORGA – Proposed Complete Data Structure

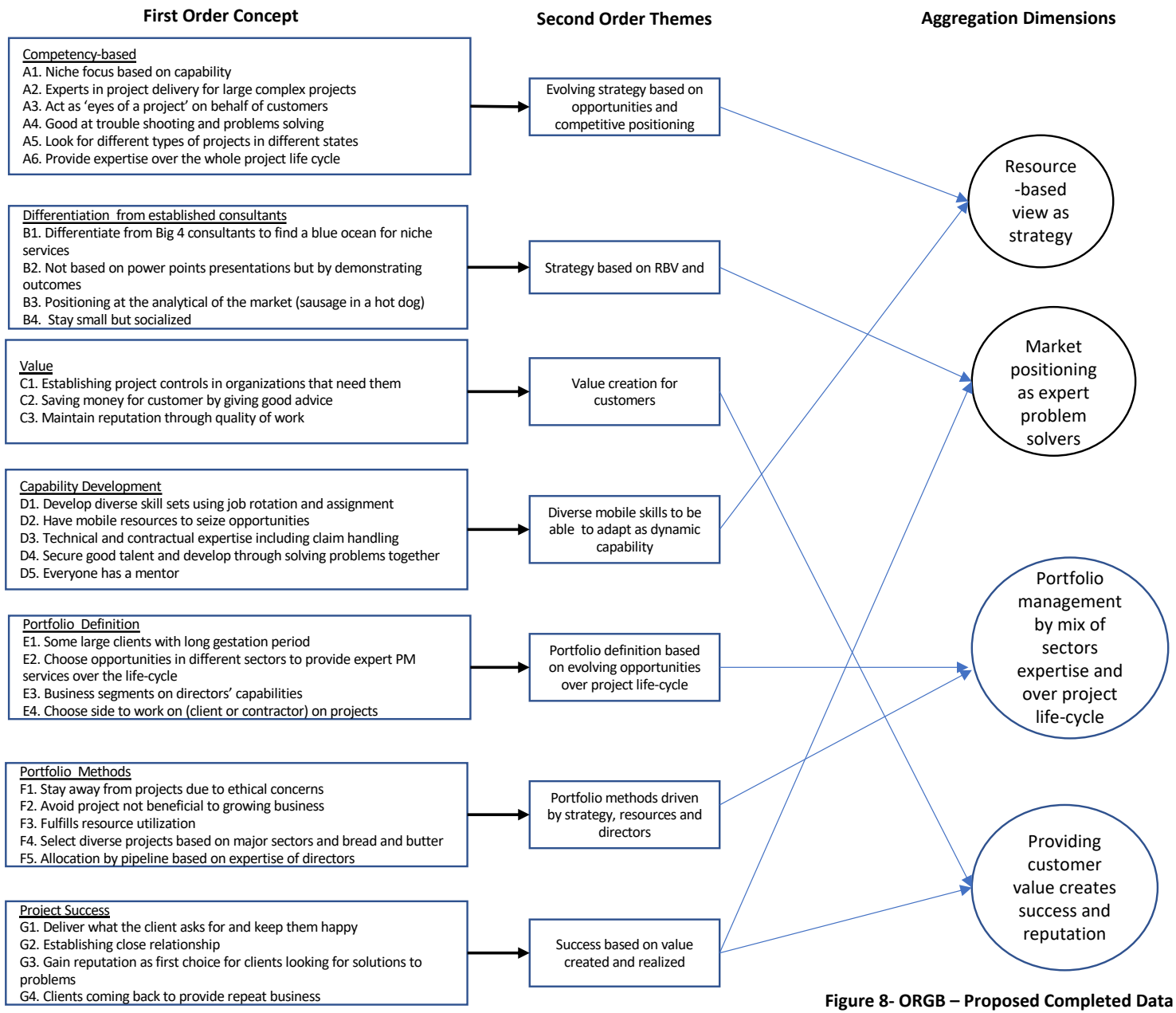


Figure 8- ORGB – Proposed Completed Data Structure

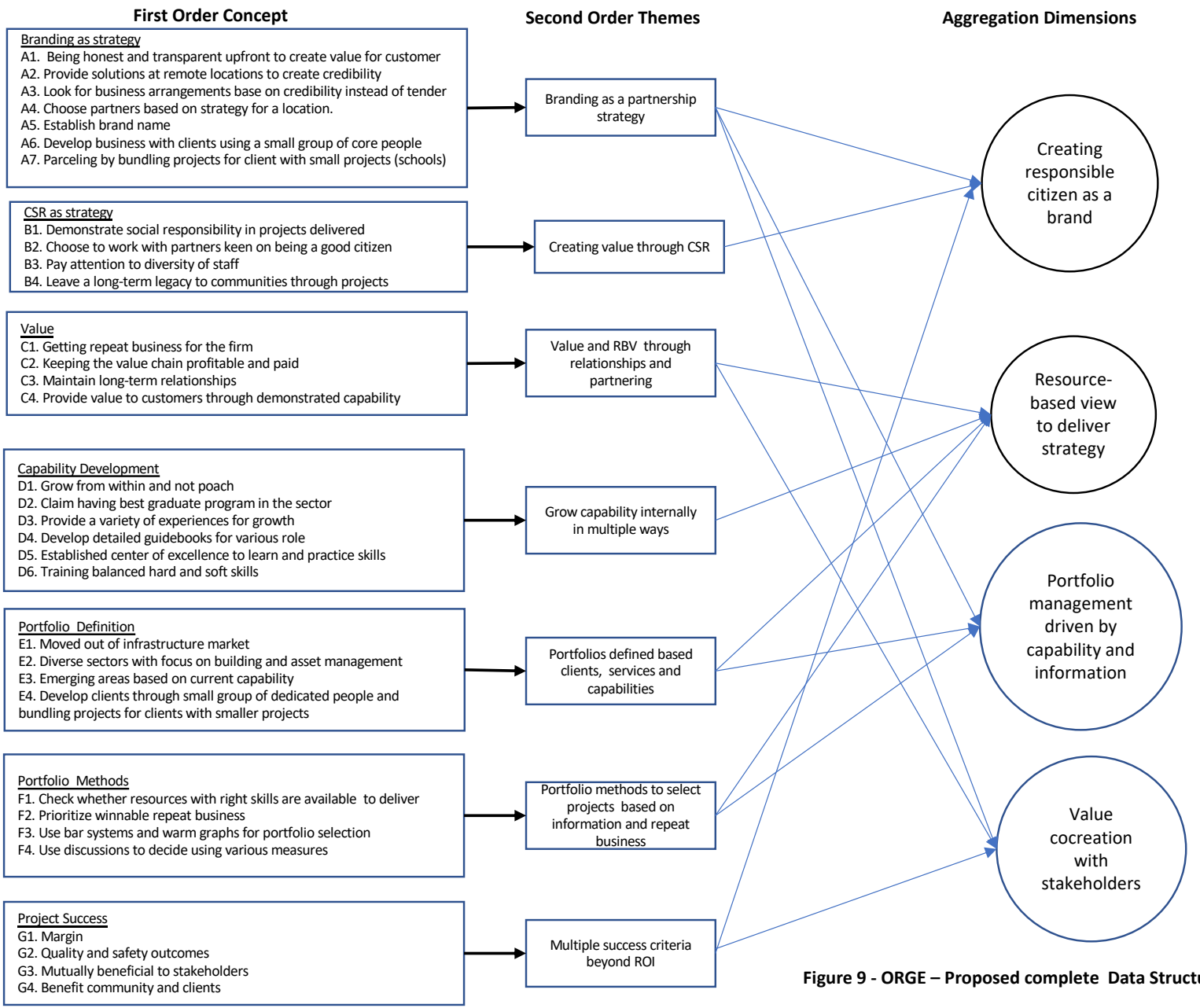


Figure 9 - ORGE – Proposed complete Data Structure