Project Management Institute

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EXECUTIVE SUMMARY REPORT

July 2015

NEW RESEARCH FUNDED AND LAUNCHED IN 2015

The following studies were funded and initiated as of January 1, 2015.

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1. Evolutionary learning in strategy-project systems
   Paul Gardiner, Terry Williams, Paul Blackwell, Antonio Calabrese, Jonas Söderlund, Lixiong Ou
   Skema Business School, FRANCE

2. Exploring learning dynamics of project-based organizations through a multilevel analysis
   Anna Wiewiora, Sofia Pemsel, Artemis Chang
   Queensland University of Technology, AUSTRALIA

3. Responsible Leadership in Projects: Insights into Decision-Making
   Nicholas Clarke, Malcolm Higgs, Denise Baden
   University of Southampton School of Management, UK

4. Incentivizing Collaborative BIM-enabled Projects: a synthesis of agency and behavioral approaches
   Chen-Yu Chang, Michelle Baddeley
   University College London, UK

RESEARCH PUBLISHED IN 2015

The following titles link to executive summaries of, or introductions to the published monograph.
Full texts are available for free download by PMI members or for purchase at the PMI Marketplace.

1. Project manager development paths: What project managers learn from their experiences and what influences their learning
   Liselore Havermans, Chantal Savelsbergh, Peter Storm, and Henk Broekema
   VU University Amsterdam, THE NETHERLANDS

2. Collaborative Project Procurement Arrangements
   Derek H.T. Walker, Beverley M. Lloyd-Walker
   RMIT University, AUSTRALIA

3. Project Management and Organizational Change
   Lynn Crawford, Alicia Aitken, Anat Hassner-Nahmias
   Human Systems International Limited and Bond University, AUSTRALIA.

4. Rethink! Project Stakeholder Management [*Publication Queue*]
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   Vienna University, AUSTRIA

5. Sustaining and developing disciplinary expertise in project-based organizations - Balanced and integrated solutions [*Publication Queue*]
   Karin Bredin, Cecilia Enberg
   Linköping University, SWEDEN

6. Visuals Matter! Designing and using effective visual representations to support project and portfolio decisions [*Publication Queue*]
   Joana Geraldi, Mario Arlt
   University College London (UCL), UK

7. The practice of Project Management in Product Development [*Publication Queue*]
   Antonie Jetter, Fatima Albar
   Portland State University, US

8. A Typology Framework for Virtual Teams [*Publication Queue*]
   Ann Ledwith, Padhraic Ludden
   University of Limerick, IRELAND

9. Organizational Enablers for Project Governance [*Publication Queue*]
   Ralf Müller, Jingting Shao, Sofia Pemsel
   BI Norwegian Business School, NORWAY

ONGOING RESEARCH

The following projects have been funded through Sponsored Research prior to 2015, and are currently pending completion.

1. Establishing a Theoretically Sound Baseline for Expert Judgment in Project Management
   Paul Szwed, Irving Susel, Kate McLaren
   Massachusetts Maritime Academy, US

2. Translational Science and Its Effects on Organizational Structure and Program Management
   Dorothy Kirkman, Kevin Wooten, Alix Valenti
   University of Houston-Clear Lake, US

3. High-performance capital project front-end: a design commons approach
   Nuno Gil, Rehema Msulwa
   University of Manchester, UK

4. Scaling Agility: Adapting Agile Principles to Large Projects in Large Organizations
   Yvan Petit, Brian Hobbs
   Université du Québec à Montréal, CANADA

5. Project Management as a Dynamic Collaborative Social Practice: Collaborative Innovation Revisited
   Roula Michaelides, Jeanne Dorle, Prof. Elena Antonacopoulou
   University of Liverpool, UK

6. Community engagement strategies during the construction phase of controversial projects
   Melissa Teo
   Queensland University of Technology, AUSTRALIA

NEW RESEARCH LAUNCHED IN 2015

The following studies were funded and initiated as of January 1, 2015.

Evolutionary learning in strategy-project systems

Paul Gardiner, Terry Williams, Paul Blackwell, Antonio Calabrese, Jonas Söderlund, Lixiong Ou
Skema Business School, FRANCE

Projects and the higher level systems they interact with are widely acknowledged as fundamental to strategy implementation. Increasingly, project management is becoming recognized as having a key role in shaping organization strategy and advancing knowledge and human development – all levers of the socioeconomic concept of sustainable social and economic business value. What is less understood is how learning takes place in the strategy-project system. Organizations and researchers have till now limited themselves to largely stereotypical paradigms of project management, based on explicit knowledge forms. These have shown themselves to be inadequate to unveil the mechanisms of learning, 'knowing in practice' and knowledge development that is required to drive strategic management and sustainable competitive advantage from project management. Evolutionary learning takes a balanced approach combining systemic and evolutionary perspectives to understand and harness these influences. This research will consider mechanisms of learning, drawing from an evolutionary learning framework across a range of geographic regions and industry sectors. The methodology is guided by a number of related theories: Giddens' structuration theory, the dynamic capabilities theory of Teece and colleagues and the work of Régner on activity configurations in the strategy-as-practice field. Using a micro-practice lens of investigation, the research aims to discover patterns of evolutionary learning and knowledge development that can help organizations to improve their deployment of project, program and portfolio systems in the strategy project system and within the broader value-based goal of socially sustainable learning and growth for economic prosperity and human development. The research will offer a new framework and direction to achieve the above aims, disseminated through a PMI monograph, two highly rated academic journals, a PMI research conference and international workshop.

Keywords: Complexity, Innovation, Knowledge management, Leadership, Methodology, PMOs, Strategy

Exploring learning dynamics of project-based organizations through a multilevel analysis

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Project learning activities are critical to project and organizational success as they capitalize on project knowledge in the broader context while overcoming issues related to project temporality and employees' mobility. Existing research on project learning tends to assume that individuals have the ability to efficiently use organizational knowledge capacities, directing their focus primarily on organizational or project conditions as influencing learning processes. Our project aims to examine, from a multilevel perspective, the dynamics of learning in project-based organizations (PBOs) delivering complex projects focusing on the individuals as learning actors and their interactions with different organizational entities and levels. This innovative study will investigate the phenomenon through a mixed method, longitudinal approach using adductive reasoning. Rich qualitative data will be analyzed to explore how ideas and actions develop and evolve over time, and to unravel the underlying dynamics of the learning process in a complex project environment where temporality and employee tension between commitments toward project versus organization is predominant. Findings of the qualitative analysis will be validated by a questionnaire study using a large, representative sample. Statistical packages such as SPSS and MPLUS will be used for the quantitative analysis. Data will be collected from a multinational subsidiary PBO that delivers a range of production, R&D and process improvement projects. The expected outcome of this project is the development of a multi-level framework of the learning process in PBOs. This framework will offer a holistic and integrated understanding of learning dynamics in this specific environment and contribute to

building theory related to a multilevel learning process with the individuals in focus. From the practical perspective, this outcome will support project management practitioners in designing knowledge development strategies encapsulating project learnings to a wider organizational context, through a better understanding of the interrelations between individual, project and organizational levels.

Keywords: Knowledge management , Multilevel approach, Project learning

Responsible Leadership in Projects: Insights into Decision-Making

Nicholas Clarke, Malcolm Higgs, Denise Baden
University of Southampton School of Management, UK

There has been limited research to date examining how corporate social responsibility concerns influence the behaviors of project managers nor the types of ethical dilemmas they face. Over the past decade a body of literature has sought to integrate CSR, ethics and leadership together in a theory of responsible leadership that aims to understand better how more effective and sustainable models of ethical leadership can be incorporated into business. Despite much theorizing and some case studies, empirical research in the area is scarce. This longitudinal study proposes to follow four projects over 12 months and identify the types of personal conflicts that arise for project managers as they interact with project team members and stakeholders. In so doing we will provide new insights into ethical decision-making processes and the enablers and constraints of responsible leadership in project contexts.

Keywords: Decision-making, Leadership, Stakeholder management

Incentivizing Collaborative BIM-enabled Projects: a synthesis of agency and behavioral approaches

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In recent years, Integrated project delivery (IPD) (or partnering) and Building Information Modeling (BIM) have been advocated to be used jointly as the solution to coordination problems experienced in traditional procurement. IPD is one type of collaborative governance with emphasis on “best-for-project thinking” and “shared risk and reward.” While a greater amount of collaboration could lead to productivity improvement, it seems naïve to expect that collaboration would emerge among project participants without the proper incentives. This research contends that the differential performance across BIM-enabled projects could be attributed to the “characteristics” of the way IPD parties are incentivized. The link between incentivization system design and project performance is a foundation for discovering the factors for effective collaboration under BIM. Whereas agency theory has been dominant in the study of incentives, growing experimental evidence reveals that systematic biases may prevent people from taking the best course of action. According to the behavioral approach, human behavior is not only shaped by underlying incentives, but also by the presentation and framing of decision contexts which will be shaped by institutional and organizational settings and the presentation of default options. These new insights start to break the “false” line that traditionally divide the economic and behavioral approaches. The complementarity of the two approaches holds promise to enrich our understanding of the efficacy of BIM under construction collaborative governance. Through four case studies in three national contexts (China, UK, US) and an econometric analysis of large survey data, this research is aimed at identifying the current best practices on incentivization for collaborative governance and theorize these practices by drawing upon both approaches.

Keywords: Organizational agility, Collaboration, Decision-making, Governance, Performance measurement, Risk

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Project manager development paths: What project managers learn from their experiences and what influences their learning

Liselore Havermans, Chantal Savelsbergh, Peter Storm, and Henk Broekema
University of Amsterdam, THE NETHERLANDS

Why investigate project manager's learning experiences?

Project managers learn by doing. They derive their knowledge and insights about their job mostly from their experiences in practice. This phenomenon, which differentiates project managers from their colleagues in other specialist management areas (other than general management), can be explained on several grounds:

1. Many project managers do not fulfill their responsibilities on a permanent basis. It is something they do alongside another job position. It is this primary, more permanent, position for which they have been educated and trained.
2. But even among project managers who take on the job on a permanent basis there are many who did not purposely look for this role when they entered the job market. They happened to "roll into it" at some stage in their career. As a consequence their formal educational preparation in project management is limited.
3. Project management as an occupation is not yet a recognized profession (Zwerman, Thomas, & Haydt, 2004). Although there are widely recognized bodies of knowledge, the application of this knowledge is not at all standardized and normalized. Those who direct project managers in the execution of their job generally often use their own personal norms and standards about what constitutes good practice in project management. As a consequence project managers have to re-adapt themselves frequently to the expectations of a new principal in a particular project. This they can only learn in practice.

If project managers learn mostly by doing then the question rises *what* they actually learn and *how* this learning takes place. In the interest of the occupation and of the project managers themselves it is important to know the answers to this question. As long we don't know the answer then it remains difficult to:

- Align the intended career paths with the actual development paths of project managers.
- Support the development of project managers with adequate and just in time training programs or with appropriate coaching and mentoring.
- Enable sharing of knowledge among project managers.

Unfortunately the central question of this investigation –what project managers learn from their experiences and how they learn it- has not been the subject of empirical research as yet. This is why the current investigation has been executed.

What was investigated and how?

The leading questions of this investigation are:

1. What do people like and dislike about being a project manager?
2. How do they get involved in the job?
3. Which experiences have a significant influence on the way they practice their job?
4. What did they learn from these experiences?
5. How did they learn and who influenced their learning?
6. Does personality have an influence on what project managers learn from their experiences?

To find answers to these questions 31 experienced project managers were interviewed. The sample included male and female project managers from three different industries and two different countries. The interviews were recorded and transcribed word by word. In addition, all project managers in the sample completed a personality test and answered a short survey. To analyze the content of the interviews the answers were coded using an extensive coding scheme.

What are the main results?

The main results of the study can be summarized as follows:

1. *What do people like and dislike about being a project manager?* Most liked aspects of the job are: getting to results, leading a team and variety of challenges. Least liked are: frustrating processes, administration and stress due to conflict and overload.
2. *How do they get involved in the job?* A majority of the interviewed project managers did not formally apply for the job but were asked to take on some of the responsibilities or took these responsibilities on their own initiative. As they did so they started to like these responsibilities and became aware that they fit their abilities and vocational interests.
3. *Which experiences have a significant influence on the way they practice their job?* The experiences mentioned by the project managers represent a wide variety. Most frequently mentioned experiences are those which relate to having to deal with conflicting interests, scope changes and different opinions about the preferred project approach. Least mentioned are experiences relating to the technical or methodical aspects of project management.
4. *What did they learn from these experiences?* The lessons learned also represent a large variety. Most mentioned lessons learned relate to learning to understand what is really expected of the project manager, to developing the most important interpersonal skills and to project governance.
5. *How did they learn and who influenced their learning?* In most cases the project managers were not at all prepared for the experiences they mentioned. They had to find out for themselves what the real meaning of a particular experience was and how to deal with it. If guidance and support was given during the experience this came mostly from a line manager.
6. *Does personality have an influence on what project managers learn from their experiences?* Personality does seem to have an influence, particularly with regard to how project managers interpret their experiences and what they learn from them.

How can resource managers and project managers apply these results?

Resource managers can benefit from the results of this study by:

- Checking whether the distribution of personality profiles among the pool of project managers sufficiently represents the future needs of the company.
- Briefing their project managers before they start a new project and helping them to focus on what they can learn from the new project.
- Debriefing their project managers –interviewing them similar to the way it was done in this investigation- and using the outcome of the debriefing to decide which next project will be most beneficial for the professional development of the project manager.
- Giving support by mentoring their project managers and arranging the sharing of knowledge and insights among project managers.

Project managers can benefit from the results of this study by:

- Being aware of their own personality profile and the influence this might have on how they interpret their experiences and draw lessons learned from them.
- Taking responsibility for their own learning by charting a development path for themselves. This path should indicate which kinds of project and experiences they will need in what order to develop themselves effectively.
- Calling in the support of a mentor or coach whenever they meet with new and confusing experiences.
- Investing time in regularly sharing knowledge and insights with colleagues.

Actions and measures like these are likely to reduce the chance of having to “re-invent the wheel” and increase the chance of a focused and more rapid professional development.

Key words: Project management Careers, Professional development

Collaborative Project Procurement Arrangements

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Access PDF practitioner summary, for concise interpretation with an emphasis on application of results

The research question

Clients choosing a specific category of relationship-based procurement (RBP) would benefit from a clearer definition of not only the characteristics of these project procurement arrangements but also the knowledge, skills, attributes, and experience (KSAE) required of project managers delivering these projects. Several research questions naturally flow from this research problem:

Q1 – What are the fundamental characteristics of emerging relationship-based project procurement arrangements?
Q2 – Do these arrangements vary in different parts of the world and, if so, in what way?
Q3 – What specific KSAEs that are required to deliver such projects are currently underdeveloped or missing from traditional project managers' knowledge and skills sets?
Q4 – How may any identified gaps be bridged?

Context of the research

This research is undertaken within the context of the global construction industry sector. More specifically, it deals with form of relationship-based project procurement and delivery for large-scale building and engineering infrastructure works. It undertakes analysis of data gathered from subject experts from Australia, the U.S., Hong Kong, the U.K. and several European countries.

Brief overview of the methodology

We adhere to the paradigm of project management (PM) and project procurement arrangements being a socially constructed concept. These arrangements did not exist before people started to do what we describe as project work. We believe that *PM* and project *procurement* exists in the sense that we find it convenient to interpret activity we can observe. People do *PM* work when they transform an idea of some kind of beneficial change (such as creating a software tool to perform a set of functions, or building a new transport facility for people and goods to be moved around a city, or transforming a business's administration system to comply with certain needed standards) into a project output. The process of obtaining the required resources to perform this transformation is what we perceive the major role of a project procurement process. Our perspective of what we assumed to exist drives us to believe that PM and a procurement choice for a project owner representative (POR) exists as a social construct. Therefore, we argue that attempting to conceptualize the phenomenon of a project procurement system must be based on trying to understand the descriptions and stories of project managers engaged in a project procurement process. We view PM as a learning and transformational co-generated learning process.

We undertook a research approach of interviews with 50 subject matter experts, 14 of whom were academics and 36 practitioners. We first reviewed the literature, both from a scanning the environment sense to gain an appreciation of the state of the art but to also hone in on particular case study work that we consider could reveal additional insights that could inform our research. Often authors of case studies and other studies are obliged to edit out important insights to focus their paper for a particular audience. Additionally, authors may be able to reflect on their results as time has elapsed and current context changes since the materials and evidence were published. We therefore initially relied primarily on the published literature and our reflection on our research to identify 14 subject matter experts (SMEs) who we could interview. We also reflected upon and re-examined several previous related research studies that we had completed. We interviewed a total of 36 subject matter experts from several countries and our interviews were recorded and transcribed to provide over 500 pages of transcription that we analyzed using a grounded theory sense-making approach with the aid of the NVivo10 tool. Findings were validated through a series of presentations to academics at international conferences in Australia, the U.K., the U.S., and in several European cities. We also presented findings for review and comment to two separate sets of subject matter experts from those we interviewed in the U.K. in October 2013, one at Oxford University in the U.K. and the other at the Cabinet Office Westminster, the U.K. Details of the methodology, the description of those interviewed and the validation process is contained in the monograph.

Brief Overview of the Findings and Application for Practice

We believe that the value that this monograph contributes to the PM literature can be summarized with reference to the monograph as follows:

- A substantial discussion and presentation in Chapter 2 of PM theory that underpins the study and linked it within a project procurement context;
- A substantial discussion and presentation in Chapter 3 of business theory aspects of RBP that sets the study in context and underpins the study within a project procurement context;
- A substantial discussion and presentation in Chapter 4 of human behavior aspects of RBP that sets the study in context and underpins the study within a project procurement context;
- Table 6 that updates and presents findings from our Alliancing Association of Australasia (AAA) study of profiling Alliance Manager Excellence. The table now presents a model that incorporates feedback from practitioners who enthusiastically supported its applicability to both alliance managers and high performing project managers working on complex projects;
- Table 9 that presents a current definition of RBP arrangements as understood in a set of countries in the world. This provides a significant attempt to explain the terms and how the approaches are applied globally;
- Figure 25 that provides a model for categorizing collaboration forms linked to RBP terms, generally used globally together with Table 10, that explains the degree of relationship intensity characteristics to supplement the understanding that readers can gain from Figure 25;
- Figure 27, the Wittgenstein's Idea of Family Resemblance model that identifies 16 "petals" or elements that has been grouped into platform foundational, behavioral factors and processes, routines, and means drivers of RBP forms. This, together with Table 11, Table 12 and Table13 explains in detail what each element and sub-element/theme means and how the element may be measured. This provides a RBP taxonomy visualization model that can be developed through a color-coded table (an example of this is presented in Table 14, with a sample analysis presented in Table 15) or a radar chart diagram for any given RBP configuration, as illustrated in Figure 28. This facilitates better understanding of each element's characteristics. KSAEs and benchmark standards can be determined by using the associated table in Appendix 2, enabling best use of each element's characteristics to deliver value through the project.

This contribution addresses the research aim to present a body of research work that helps people better understand the various emerging forms of RBP and how to identify what KSAE may be required for any particular RBP form.

The principal practical value delivered by this monograph includes presentation of a visualization tool for understanding project procurement arrangements so that as they evolve over time and are interpreted across the world, a more explicit and clearer explanation of how they fit upon a relationship-based procurement continuum might be used. This should help academics, practitioners and policy makers become more confident that they are "speaking the same language." The second main contribution made is the development of the relationship-based procurement taxonomy that is presented in Chapter 6 of Section 1 of the book and elaborated upon in Appendix two of Section 2.

Keywords: Project alliances, Relationship-based project procurement, Competencies

Project Management and Organizational Change

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Access PDF practitioner summary, for concise interpretation with an emphasis on application of results

Organizational changes have become recognized as a distinct type of project or program, and it may be argued that the majority of projects involve some degree of organizational and behavioral change. The degree of this change can be expected to be greater in projects where the purpose is to achieve organizational change, but even where the focus is on other outcomes, achievement of desired benefits may require structural changes and will generally involve some change in the way people do things. However, while project managers claim to be implementers of change, current project management standards focus on change control but largely ignore the complex and emergent characteristics associated with implementation of change that is necessary to deliver value.

This report presents results of a quantitative research study undertaken in response to a request from the Project Management Institute, through their research program, for proposals to investigate the relationship between project management and organizational change. The primary aim of the study was to identify the nature of practices used by those in project, program and change roles in managing projects requiring varying degrees of organizational and behavioral change.

From a project management perspective, a major finding of this research is that those in project roles appear to be embracing change implementation practices, despite their absence from the main project management standards for both knowledge and performance. Change implementation practices are being used by project management practitioners across a range of projects independent of degree of organizational and behavioral change and industry sector. All project, program and change implementation practices were found to be associated with the success of projects, but those practices found to be the strongest predictors of likelihood of project success are drawn from the change implementation toolkit: making informed decisions and ensuring business integration. Notably, those who hold some form of project management professional certification appear to be more likely to use higher levels of business integration practice.

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Rethink! Project Stakeholder Management [Publication Queue]

Martina Huemann, Pernille Eskerod
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Project stakeholder landscapes are becoming more and more challenging. Many projects fail because stakeholders ´ expectations and interests are not sufficiently steered and managed. Some project stakeholders have power and may put the project under pressure. They judge the potential project success and decide whether they want to get involved, contribute and accept the project outcomes.

In the context of striving for sustainable development, the involvement of stakeholders has become even more important, as the cooperation with stakeholders may support the creation of shared benefits. Although project stakeholder management is not a new topic and has been considered as an important task in project management, recent stakeholder theories are not considered in project management.

Considering sustainable development principles in managing projects broadens the perspective and leads to a more holistic view as it makes the complexity of the project in its specific context visible. Nevertheless, project managers and their teams are challenged, as they may not find the adequate methods by hand to make this complexity visible and deal with it. This research project contributes to this gap in theory and practice. We aim to rethink Project Stakeholder Management, and named our project: *Rethink!PSM*.

The objectives of the research project: *Rethink!PSM* were

- Development of a more holistic project stakeholder management understanding - in the context of Sustainable Development - that considers new insights from stakeholder theory.
- Experimenting with systemic constellation methods for a stakeholder analysis to be better suited for dealing with the complexity of contemporary project landscapes
- Reflection of potentials and limitations of a more holistic stakeholder management
- Dissemination of research results

Research approach

The research project: *Rethink!PSM* was conducted by an international research team from WU – Vienna University of Economics and Business and from the University of Southern Denmark and used a knowledge co-creation process with practitioners and other researchers. We used as a systemic-constructivistic research approach based on the epistemological paradigm Radical Constructivism, the organizational paradigm Social Systems Theory, and the methodological paradigm Qualitative Social Research. Project management and stakeholder management researchers as well as practitioners were cooperating in this research project. We performed practice and demonstration case studies and discussed the research results in focus groups, as well with the wider practice and research community in conferences and workshops in order to co-create knowledge.

Case studies

We had four case study partners, with whom we performed three practice case studies to investigate project stakeholder practices and three demonstration case studies to experiment with systemic methods (systemic constellation and systemic board) for project stakeholder analysis. The case studies derived from different contexts such as transport sector, municipality and university and were from a variety of locations (Austria, Denmark, Sweden). The four case study projects were:

- *Project: Branding Slagelse Strategy*: The objective of the project was the development of a new branding strategy for the municipality of Slagelse, Denmark.
- *Project: Establishing WU New Campus*: The objective of the project was the establishment of a new university campus by WU Vienna, Austria.
- *Project: Planning the West Link*: The objective of the project was the planning of a double track railway through the city of Gothenburg, Sweden.

- *Project: Internal IT implementation*: The objective of the project was the implementation of a new IT system in an international industrial group situated in Denmark.

Research results

What can project stakeholder management learn from stakeholder theory?

Stakeholder theory differentiates a ***Management of Stakeholders*** approach and a **Management for Stakeholder** approach. This distinction of approaches is what project stakeholder management can learn from stakeholder theory.

In the notion of a ***Management of Stakeholders*** approach, a project needs stakeholder contributions to fulfill its purpose. The stakeholders are means and are used as instruments to meet the purpose of a project. These contributions are financial and/or non-financial and typically different for various stakeholders. As well as the stakeholders may affect the project, the project affects stakeholders. This affect can be positive such as creating future income and learning opportunities, and/or negative such as creating side effects like pollution and stressful working conditions. All project stakeholders have their own opinion about the possible project success based on the outcome of their own personal assessment. If they assess the final project outcomes not to be acceptable, they may refuse to contribute to future related projects. They may even influence other project stakeholders to perceive the project as unsuccessful.

In contrast, the ***Management for Stakeholder*** approach represents a more holistic approach. It is based on the understanding that all stakeholders are valuable in their own right and that they are entitled to receive management attention regardless of their help or harm potential. The global request for considering sustainable development increases the need for project stakeholder management even more, specifically it calls for different values. Values like transparency and fairness constitute a ***Management for Stakeholders*** approach.

Combining both approaches ensures a higher flexibility regarding project stakeholder management. How and with what methods different stakeholder relationships are managed depends on the stakeholder itself and on the context of the project. Using a multi methods approach and consider the ***Management for Stakeholders*** as well as a ***Management of Stakeholders*** approach creates shared benefit for both the project as well as for stakeholders.

Which systemic methods are suitable for a holistic stakeholder analysis?

Existing tools for project stakeholder analysis are often project centric, thus neglecting that the project may not be important for the particular stakeholder. Furthermore, these analysis methods are typically limited in grasping the dynamic between project, the stakeholder as well as other elements. Traditional understandings of project stakeholder management suggests that by detailed planning, defined measures and by controlling these, the project manager can manage the project stakeholder complexity and gain and remain considerable control over the project and its stakeholders.

In contrast, defining a project as a social system implies that a simplistic and linear understanding of managing stakeholders does not fit to project reality. Many project managers ignore the complexity and try to oversimplify a complex situation by ignoring the context in which they manage. These simplistic understanding is based on the understanding that project managers can influence stakeholder directly, and these understanding contradicts reality. Stakeholders have their own interests and their own "free will". Project manager need to deal with the existing complexity and try to design adequate relationships to stakeholders and manage these. This includes that project managers have methods that help them to analyze the dynamics of stakeholder relationships.

Systemic constellation methods have the characteristics to deal with this complexity and allow thinking in a broader and more holistic way, more suitable in a society that strives for sustainable development. Further they are quick, relatively cheap and make relationships between stakeholders visible. Systemic constellations brings benefits to project managers and project teams. These can be summarized as following:

- Implicit knowledge becomes explicit: The spatial positioning of blocks or people and the reflection of feelings gives much information about the different relationships and implicit knowledge becomes explicit. Hidden agendas and conflicts become visible and thus it's possible to deal with different situations.
- Support a better understanding of conflict parties and their emotional experience: During a conflict situation the emotional level of stakeholders is very high. Different forms of systemic methods give the opportunity to get a different perspective of the situation and to think about ways how to deal with the conflict situation.
- Identify measures and actions as well as new ways and strategies to deal with complexity and conflicts. In systemic constellations different solutions and measures can be simulated and reaction of the different stakeholders tested.

We identified systemic constellation as useful for project stakeholder management and demonstrated different methods in different case studies.

Which are the potentials and limitations of a more holistic project stakeholder management

In case of our research we identified different potentials and limits for a more holistic project stakeholder management. In the context of sustainable development a broader and more holistic view in project stakeholder management is necessary. Traditionally only "stakeholders that count" are considered and their relationship managed. This narrow view stays in contrast to the vision of sustainable development. Project stakeholders are seen as resources from which the project can benefit. Other parties that are interested in the project but are not used as resources are very narrowly considered.

In a holistic project stakeholder management, all stakeholder count on the same level and all stakeholders have the right to be considered. This holistic view represents a benefit for the project as different perspectives of different stakeholder can increase the quality of the project results. However, that also means that the project needs to be prepared to deal with the different expectations and interest of different stakeholder groups.

To performance of a more holistic stakeholder management is directly influenced by values – values of the individual but also company values. It is linked to the values of sustainable development such as transparency, openness and trust. The application of a holistic project stakeholder management can gain benefit for both – the project as well as stakeholders – but is also limited to the openness and trust of the project manager, the project team as well as to the stakeholders.

Recommendations for project managers

We recommend project managers and their teams to consider stakeholder management as a core task of project management. This includes bearing in mind their ethical responsibilities for different project stakeholders, instead of only fulfilling the interests of the project owner/investor at costs of all other stakeholders. For such a more comprehensive stakeholders approach, project managers need to be open to embrace the complexity, without getting overwhelmed. In our study, we offer systemic constellation methods such as systemic board or management constellation to grasp complex situations. The study provides insights on constellation methods that have the potential to help project managers and their teams to create comprehensive solutions in contemporary project contexts.

Research approach and limitations

We combine Radical Constructivism and Social Systems Theory with a qualitative research approach. In the notion of this research approach, we cannot prevent that the research study is influenced by our experience and our perceptions. Our choices and differentiations of what we consider as important and what we had to neglect, shaped the research process and finally the research findings. We therefore try to make the process as transparent and traceable as possible. However, we are aware that our choices are the main contributions and at the same time the main limitations of us as knowledge creators.

Keywords: Stakeholder management, Teams

Sustaining and developing disciplinary expertise in project-based organizations - Balanced and integrated solutions [Publication Queue]

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The purpose of this study is to explore organizational solutions for sustaining and developing disciplinary expertise in firms that rely on co-located interdisciplinary project teams. The research aims at contributing to finding answers to the following questions:

1. What different types of solutions for organizing disciplinary expertise have developed in project-based firms that rely extensively on interdisciplinary and co-located project teams?
2. In what ways do these different types of organizational solutions address the inherent challenge of sustaining and developing disciplinary expertise in the long run, when people over time work mostly in co-located interdisciplinary projects?

Based on previous research, the book suggests that disciplinary expertise include three main building blocks; Knowledge, Knowing and Contextualizing, which we propose are all important to address in the maintenance and development of disciplinary expertise. Based on these building blocks, we develop the KKC framework that is used to analyze the various organizational solutions which have emerged for the maintenance and development of disciplinary expertise in the empirical cases which we have studied.

This research is undertaken in three project-based firms involved in advanced product development requiring specialized engineers to integrate their knowledge in solving complex problems. The three companies develop advanced software-based products and systems, sensor systems and medical IT systems respectively. The empirical material was collected by semi-structured interviews with management representatives and disciplinary experts at the respective company's R&D unit.

Our case studies reveal a number of organizational solutions used to sustain and develop disciplinary expertise in project-based firms which rely extensively on interdisciplinary and co-located project teams. These solutions consist of structural solutions and activity-based solutions respectively. Structural solutions refer to solutions that have to do with the organizational structure *per se*, while activity-based solutions include activities and arenas which have emerged as a response to particular problems and they were often, but not always, initiated by the disciplinary experts themselves.

Structural solutions can be divided into two types; the establishment of expert units with the aim of building disciplinary leadership and the establishment of expert units with the aim of enhancing disciplinary community. In the first type of solutions, an expert unit is established with experts within *different* disciplinary domains. The main function of this type of unit is to let selected experts focus on building expertise within their respective disciplinary domain and on spreading disciplinary expertise to their disciplinary peers, who are dispersed in projects across the organization. In the second type of solutions, an expert unit is established with experts from the *same* disciplinary domain. The main function of this type of unit is to create a strong community among disciplinary peers within a particular disciplinary domain, rather than to secure disciplinary leadership for members in the disciplinary teams to benefit from. The activity-based solutions were categorized into five different types depending on their focus; 1) collaboration among disciplinary peers at work, 2) organized learning arenas, 3) external networking, 4) individual activities and 5) seeing the product in action. Each type of activity-based solution supported disciplinary expertise in different ways and to different extent.

Our findings also suggest that organizational solutions which are horizontally integrated, i.e. solutions that support several of the three building blocks which have been suggested to be essential to disciplinary expertise (knowledge, knowing and contextualizing), are more viable than those who are not. Further, our empirical results also indicate that organizational solutions which are vertically integrated, i.e. which are integrated into every-day work processes, the product development process and the corporate strategic goals and technical road-maps are more viable in the long run than those which are not.

Visuals Matter! Designing and using effective visual representations to support project and portfolio decisions [Publication Queue]

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The research problem and question

This book is the result of a two-year research project, funded by Project Management Institute and University College London to explore how visuals can be used and designed in the project, program and portfolio contexts and with what effects. Visuals are integral to how we manage projects; consider e.g. Gantt charts, stakeholder maps, traffic lights, bubble charts, PowerPoint slides. Visuals are an opportunity to think sharper, quicker and clearer. Yet, they also constitute a threat, can bias decisions and encourage detrimental behaviors. Project managers and researchers alike have paid little attention to visuals and how they can be used mindfully. The intent of this book is to increase the awareness of project practitioners and scholars about the importance of visuals and to provide guidance on how they can be used and designed.

The research underpinning the book is focused on the impact of visuals on cognition and communication in project portfolio decisions. Our empirical research delves further into the role of visuals in cognition. Cognition is critical in this context. The complexity of portfolio problems quickly exceed human cognitive limitations as a result of: a large number of possible combinations of projects in a portfolio, project interdependencies, a high degree of uncertainty (as future outcomes are unknown and goals and constraints change over time) and the need to balance different and changing objectives of multiple stakeholders.

The irrationality in the behavior of decision makers constitutes an additional challenge, an aspect that is widely studied in decision theory and mostly neglected by the current project management literature. When making decisions, executives are both rational and intuitive. While intuition is important, we contend that the analysis and use of data is pivotal to address the complexity of portfolios and make effective decisions.

Visuals can help, as they are a powerful cognition aid. Therefore, this research contributes to a better understanding of the use and design of visuals, and how they can support cognition in portfolio decisions.

Specifically, our goal was to better understand, what role visuals can play in portfolio decisions, and how the use and design of visuals can influence cognition in portfolio decisions, and ultimately to help project and portfolio management practitioners enhance their visual literacy.

Context of the research

The Challenge: Portfolio Decisions

PPM (Project Portfolio Management) can be complex; it is a dynamic and political decision process that typically involves a group of decision makers, who periodically select, balance, review and terminate projects. Early approaches to PPM reduced project portfolio decisions to mathematical optimization problems and emulated techniques from financial portfolio management, namely modern portfolio theory. In reality project portfolio decisions are also social processes, characterized by the involvement of multiple actors and affected by preferences, biases and political interests of individuals and groups.

Three types of complexity impact PPM: (1) structural complexity, resulting from the large number of potential portfolios due to the possible combinations of projects, interdependencies between projects, (2) uncertainty, due to the lack of information, the stochastic nature of future outcomes, and changing goals and constraints, and (3) socio-political complexity, resulting from "bounded rationality" of decision makers, group dynamics, as well as varying and changing objectives of individuals involved.

The Opportunity: Conscious Design and Use of Visuals

If properly constructed or selected, visuals can help address the complexity involved in portfolio decisions. Visuals can be powerful cognition aids, as they impact sensemaking, which is the process of creating a frame of reference to give meaning to a situation, which will inform actions and decisions.[1]

[1] Sensemaking is an active, two-way and iterative process through which people find or construct a story to account for the data in their own frame of reference, based on information available to them, their goals, experience, convictions, commitment, emotions etc. Continuous try-out of new frames and re-framing takes place, especially in a group setting: negotiating and group sensemaking set in.

Visuals can support sensemaking and ultimately decisions by:

- encouraging engagement with different perspectives on the multi-faceted portfolio problem, e.g. portfolio balance, strategic alignment, maximization of financial value, identification of projects that do not meet threshold, etc.
- enabling decision makers to more effectively process large amounts of data and solve problems quicker and more accurately
- improving clarity, since complex relationships can be understood more easily and quickly than textual information
- leveraging our natural abilities to rapidly recognize visual patterns
- extending the short-term memory, which is otherwise very limited

Therefore, visuals help cope with structural complexity and uncertainty, reduce cognitive biases, support negotiation and discovery processes and hence address socio-political complexity.

Yet, despite such benefits, visuals can also influence communication and cognition in a negative and detrimental way. For example, visuals can intensify insignificant differences through inconsistent scales, falsely instill confidence through their professional look, or encourage unwarranted comparisons. Regardless of whether such effects are consciously designed or not, their influence on decisions remains, as visuals have become part of portfolio decisions.

Many types of visuals are used in project portfolio management, for example bubble charts, treemaps, heatmaps, Gantt chart and calendar charts, portfolio funnel, portfolio tables, roadmaps, network diagrams, efficient frontier graphs, decision trees and others. While certain types of visuals are reoccurring in the literature and in practice, there is little consciousness about the importance of designing or selecting the best possible visual for a task at hand. Hence learning more about how visuals impact our thinking is critical to project, and portfolio management.

Tapping into the Potential: Enhancing Visual Literacy

Enhancing visual literacy involves the development of three critical abilities: (1) the ability to *design* visuals, i.e. to consciously produce, compose and create visual messages, (2) the ability to *use* them effectively, (3) the awareness for the importance of *user and designer*'s idiosyncrasies, such as experience, familiarity and emotional reactions to visuals. Our literature review conveys insights to help project practitioners to develop competencies in these three areas. Most of these insights are condensed in the guiding principles for visual design and use in the context of portfolio decisions, summarized in the table below:

Principle	Explanation	Relevance to practice
Interactive	Visual allows users to change and organize data and parameters within an established structure	Interactive visuals enable the user to think and probe ideas through the visuals, i.e. to organize, reorganize and look at data from different perspectives, and thereby enhance understanding of the problem.
Purposeful	Visual addresses at least one relevant perspective of a portfolio problem	Purposeful visuals enable the analysis of different perspectives of portfolio problems, such as trade-offs, interdependencies, strategic alignment, stakeholder support, etc. Use of a combination of purposeful visuals can therefore help reduce mistakes, ensure analysis of most relevant perspectives, etc.
Truthful	Visual displays relevant data accurately	Whether consciously or not, visuals can deceive. This can result from poorly constructed visuals, e.g. scale inconsistency, etc., but also more subtle mechanisms, such as filtering data, creating different emphasis, and evoking an image that does not represent the 'reality' (e.g. more precise, more mature, etc.) Understanding these mechanisms is key to recognize, avoid and, consciously (and we hope also ethically) use them.
Efficient	Visual takes advantage of our natural ability to interpret. It consciously displays the maximum amount of information in the smallest space possible, so the visual can be processed rapidly and accurately.	Efficient visuals tap into the potential of our visual system to enhance our ability to think quicker and sharper.
Aesthetic	Visual is perceived as harmonious, professional and beautiful.	Aesthetically pleasant visuals can be considered more trustworthy, improve usability, adoption and recognizes a rather emotional connection with workplace and business tools (amongst them, visuals)

Our methodology

The conclusions from our literature review, research and practitioner experiences were translated into research propositions that were tested through a human subject experiment with 204 UCL students. The participants of the experiment were asked to select a project portfolio for a company and provided a choice set of 16 projects available for consideration, a prescribed strategy statement , a set of defined financial and non-financial goals and portfolio-level funding and resource constraints. Participants made decisions based on four different dashboards, constructed with visuals that exhibited varying degree of adherence to the five visual design principles. The different dashboards were randomly assigned to participants to support an identical portfolio decision assignment and in some cases to repeat the assignment with a different dashboard. Variables of interest, i.e. demographics and individual differences that could have influenced decisions were assessed through a post-experimental interviews and survey.

Summary of findings and practical relevance

Based on our experimental and literature research, a set of practical recommendations for designing and using visuals both in the general and PPM-specific context has been established, namely:

Recommendation 1: Design visuals carefully. Purposeful visuals enhance cognition and help improve decision quality and lead to more consistent results across different decision makers. Interactive visuals can further increase sense making and portfolio decisions.

Recommendation 2: Use visuals consciously. Visuals should support insight from multiple relevant perspectives that are inherent in the decision problem. While too many – especially unfamiliar – visuals may overwhelm the decision maker, an insufficient use of visuals will limit the understanding and the ability to "see" different perspectives. Purposeful use of visuals takes into consideration how, why and when to use a particular type of visual and choose the combination of visuals mindfully so to embrace relevant perspectives of the portfolio decision as effectively as possible. The careful use of new, unfamiliar visuals – provided they are purposeful – will enhance your visual literacy with time. Lastly, a critical engagement with visuals (e.g. identifying filters, omissions, distortions, presented and missing perspectives) provides insight on what interests a visual may represent.

Recommendation 3: Pay attention to the target audience. Familiar visuals should be used especially for a complex and unfamiliar context where they can enhance decision maker's confidence. When given the choice, participants of our experiment preferred familiarity over good design, hence new visuals, even if well-designed, may face some resistance. While visuals should be used that provide different perspectives of the problem –guidance may be required to encourage and enable users of the visuals to effectively engage with them. User feedback may help further improve visuals as people have valuable intuitive visuals skills.

Recommendation 4: Be careful about changing and introducing new visuals. Even if well-designed, there is a need to introduce new visuals carefully, and mind the potential learning curve necessary for the visuals to be used effectively. The acceptance of new visuals can be increased, if those visuals adhere to the design principles, and if in combination with well-known visuals. Our results suggest that a change to well-designed visuals is worthwhile, as cognition and decision quality improve. Interestingly, such improvements have not shown a necessary impact on confidence levels: confidence and decision quality are not strongly related.

In conclusion, it is critical to educate portfolio decision makers, project managers and project team members on how to use visuals in a mindful way. As common sense would suggest, a map in the hands of two different people navigating unknown territory may lead to different outcomes. The same applies to project and portfolio charts. A "visually literate" decision maker, who understands both capabilities and potential limitations of a particular visual will have an enhanced understanding of the territory and potential navigation routes and his decisions will benefit as a result.

Keywords: Teams, Knowledge management

The Practice of Project Management in Product Development [Publication Queue]

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The project management is said to have lost its relevance for innovation initiatives because it over emphasizes planning and control over flexibility, leading to approaches that are poorly adapted to high-uncertainty endeavors (Lenfle & Loch, 2010). In response, the concepts of targeted flexibility (Lenfle & Loch, 2010) and adaptive project management (Shenhar & Dvir, 2007) have been proposed: under this paradigm, the specific characteristics of a project – its uncertainty (Lenfle & Loch, 2010), structural and dynamic complexity (Brady & Davies, 2014), or complexity, novelty, technology, and pace (Shenhar & Dvir, 2007) - are systematically considered to tailor project management approaches that are adapted to project needs.

This research investigates how proposed adaptation of project management occur in a context that organizes all work in projects and has very high levels of innovation: product development in small and medium technology companies with manufactured products. These companies have a particularly pressing need for project adaptation: they manage incremental and highly innovative product development projects within the same R&D organization, rather than separating high-uncertainty, explorative research from product-focused development. Because of the physical nature of their products, they also have limited opportunities to iterate through design-build-test cycles and need to make some unchangeable project decisions (e.g. for specialized tooling) relatively early in the development process. The study thus samples cases with extreme needs for project adaptation to understand challenges and practices of similarly demanding and other project settings. Specifically, the study had three objectives (1) to understand how existent project management frameworks, such as the PMBOK, inform current product development practice, (2) to understand how product development projects are managed with standard vs. project-adapted management practices, and (3) to understand, what challenges arise in the context of project adaption. These lines of inquiry were pursued through a review of the literature on project management, product innovation, and organizational theory and through three consecutive case studies. Each study provided insights and additional questions that were addressed in the design of the subsequent study. Study 1 compared company-specific standard project management processes for product development of seven companies against the tailored process the companies had actually employed in earlier projects. Study 2 replicated the same line of questioning but within the context of a single company. Respondents in different management roles were asked to describe their company's standard process, the actual project management practice as it had occurred for selected past projects, and the organizational context in which project decisions were made. Study 3 was focused at replicating cases from the earlier studies to see if the conclusions from earlier studies would still hold true in other settings. In total 17 individuals, representing 12 different companies, were interviewed. Interview results were analyzed by the two authors, first for each study and then across studies. Furthermore, results were presented and discussed with a four person project advisory panel, which consisted of academic and industry experts in project management and new product development. Key research results can be summarized as follows:

Project management in product development is underused: frameworks, such as PMBOK, are frequently unknown and rarely used. Respondents find them to be poorly adapted to the high variance of 30-50% that is common in project plans for novel products. The resulting overhead for change reporting is of limited value competing constraints of projects scope, quality, schedule, budget, resources, and risk (Project Management Institute, 2013) play out in such a distinct way that the direction for optimization and the project decision is evident without much detailed analysis. Also, because all innovative projects are different, project data from one project is poorly applicable to other projects, limiting the usefulness of detailed documentation.

In absence of project management frameworks, the dominant model for organizing product development is a phase-gate process, such as the Stage-Gate (SG) Process. These frameworks are intended to provide high-level charters for interdisciplinary teams and executive decision-makers and organize work around review gates before major development phases are entered and additional resources are committed. Because SG is often the only form of project management in new product development, it is frequently overused and attempts are made to apply it to incremental projects that do not necessitate the same high-level management buy-in that a major new product development effort would require. This causes some companies to use a tailored, massively stripped down versions of SG for incremental projects or no project management at all. As a result, they may be less

rigorously managed and documented than may be beneficial. Also individual decision makers and their personal approaches, rather than recognized good practices, have strong impact on how projects unfold.

The early, "fuzzy" stages for new product development are focused at gaining fundamental understanding of what will determine the success of the future product and result in key project definitions, including markets, product concept, key features, and technologies. The companies in our study, however, frequently experience that projects enter later stages with what turns out to be insufficient clarity around these parameters. Though this appears to be almost more of a rule than an exception, SG is not systematically used to broaden the search for undiscovered unknowns in the front-end, nor to implement more flexible approaches downstream. Project approaches like selectionism or trial-and-error learning are rarely used proactively and systematically but only in response to downstream problems with the earlier plans. As a result, budget and schedule overruns are reported frequently. Neither the underused project management framework, nor the more frequently used SG approach currently provide sufficient guidance for reducing unknown unknowns.

Finally, the results of this study show that project management and product innovation research are currently too separated to cross-fertilize, even though both research streams have promising approaches. More integration of research work is required to address the specific challenges of targeted flexibility in new product development.

Given the still limited findings of the exploratory study, managerial recommendations have to be given with caution. Incremental development activities, such as improvements of existing products, likely neither need a SG process, nor full-blown project management. Instead, a percentage of engineering resources can be allocated for ongoing product maintenance and activities can be managed with a task list. Projects with no immediate market focus, such as technology investigations, do not benefit from SG. Project management may be relevant if schedules and tasks in different functional areas need to align but, in most cases, a simple allocation of resources and a task list should suffice. New product initiatives and custom-products both require a SG approach and project management, yet companies should be careful to differentiate the two. Technical project management activities, such as scheduling and tracking, may be best put in the hands of a project management professional, such as an analyst, who informs the project managers (typically an engineer or scientist with limited knowledge of project management tools) about the state of the project so that everyday decision-making is supported by data. SG, however, is the responsibility of the project managers and focuses on go-/no-go decisions and cross-functional hand-offs at pivotal project moments. Given how prevalent late stage "unknown unknowns" are, much more consideration needs to be given as to how projects can move forward while still maintaining flexibility to minimize risks. This will require parallel trials, quick build-and-test cycles, and agile contractual arrangements for internal budgets and external customers of custom projects. Project outcomes should not only be monitored based on tasks completion, but – more importantly – based on learning. This can occur by tracking a list of assumptions to see how many of them have turned into tested knowledge and how many are still uncertain.

Keywords: New product development, Ambidexterity, Innovation

A Typology Framework for Virtual Teams [Publication Queue]

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This report presents empirical evidence to support the existence of a typology framework for virtual project teams. In addition the relationship between virtual team types and project success is explored.
The following research questions are posed:

1. Using a set of virtual project team attributes, based on published research, can virtual team typologies be identified by empirical investigation of data gathered from a large scale sample of the project work environment?
2. Is there empirical evidence that relationships exist between team demographics and the team typologies identified from research Question 1?
3. Do the identified team typologies have specific impacts on the performance of virtual project teams?

These questions are answered using a grounded exploratory research method. A quantitative survey was distributed using Survey Monkey© to the study population, the chapter members of PMI, which is a target size of 227,646 (as of July 2012). The questionnaire was developed based on a review of the literature which identified eight key characteristics for virtual teams; temporal, geographic, culture, social, political, team membership, technology and task. The questionnaire was completed by 521 respondents.

Hard (quantitative e.g. number of team members) and soft (qualitative e.g. team vision and goals) attributes were defined for the eight key characteristics. Component factor analysis was used to reduce the soft attributes to nine factors:

1. Dedicated team members
2. Virtual team experience
3. Team leader status
4. Team status
5. Vision and goals
6. Experience and knowledge
7. Common processes
8. Cultural awareness
9. Cultural adaptiveness

Based on these nine factors cluster analysis was performed on the data. Three distinct clusters were identified; Cluster 1 (84 teams) is called virtual-challenged as all attribute mean factor scores are below the sample mean, Cluster 2 (232 teams) is called virtual-enhanced as all attribute mean factor scores are above the sample mean, Cluster 3 (194 teams) is called virtually neutral. The remainder of the study focuses on the first two clusters virtual-challenged and virtual-enhanced teams.
A small scale study of 50 practitioners experienced with working on virtual teams was conducted in order to establish working definitions for high and moderate levels of virtuality. Two physical (hard) attributes were found to define the level of virtuality of a team; 1) the maximum number of hour's difference in time zones between two locations for the virtual team and 2) the number of team locations existing for the virtual team. These attributes and their distribution within the data set were used to identify highly-virtual teams (more than 4 team locations and a difference of more than 6 hours between any 2 location) and moderately-virtual teams (fewer than 4 team locations and a difference of 6 hours or less between any 2 location). Based on these definitions the 521 survey responses were classified as highly-virtual (134 responses, 26%) and moderately-virtual (107 responses, 21%).
In summary, the answer to research Question 1 is that four typology types were identified – two soft (virtually-challenged and virtually-enhanced) and two hard (highly-virtual and moderately-virtual teams). The next stage of the study explores the relationships between these typologies and other virtual team characteristics.

Comparisons (using t-tests and chi squared tests) between the virtually-challenged and virtually-enhanced teams found four significant differences:

1. Virtually-challenged teams had significantly more team members than virtually-enhanced teams,
2. Virtually-enhanced teams were more likely to hold face two face meetings involving all team members,
3. The profile of project costs was different for enhanced and challenged virtual teams,
4. Virtually-enhanced teams had a higher level of knowledge diversity amongst team members.

Virtually-challenged teams also reported significantly more problems due to the time differences between team members. These included; difficulty in executing tasks in parallel, delays in communication, difficult functional/working relationships, lack of understanding of the different physiological and social norms of team members, conflict due to lack of understanding of the different physiological and social norms of team members, missed scheduled meetings due to confusion over clock times, and missed task deadlines due to confusion over clock times.

Similar tests between highly-virtual and moderately-virtual teams revealed the following nine significant differences:

1. Highly-virtual teams were larger than moderately-virtual teams,
2. Highly-virtual teams were more likely to work longer hours,
3. Highly-virtual teams had a wider range of nationalities involved in projects,
4. Highly-virtual teams had more organisations, more functional departments and more subject matter experts than moderately-virtual teams,
5. Highly-virtual teams were more likely to hold face two face meetings involving all team members,
6. Highly-virtual teams were more likely to have a mandatory language and a key location than moderately-virtual teams
7. Team members were more dispersed on highly-virtual teams,
8. Highly-virtual teams tended to be part of larger organisations and to work on more costly projects,
9. Highly-virtual teams were more likely to work for multinational organisations.

There was only one significant different between the impact of time difference on highly- and moderately-virtual teams, highly-virtual teams reported greater difficulty in executing tasks in parallel than moderately-virtual teams.

In summary, highly-virtual teams are significantly different from moderately-virtual teams in terms of their team demographics but not in their ability to cope with time differences. In contrast virtually-challenged teams are demographically similar to virtually-enhanced teams but report significantly more problems in managing with time differences.

The final question addressed by this project was whether or not the proposed virtual project typology had an impact on project success. Four questions, based on the project management triple constraints, were used to assess project success; 1) schedule, 2) budget, 3) quality and performance objectives and 4) client expectations; these were measured using a 5-point likert scale. No significant differences were found between the performances of highly- and moderately-virtual teams. But virtually-enhanced teams performed significantly better on all four measures than virtually-challenged teams.

This is the key finding of this research, a typology for virtual teams has been developed based on nine factors (dedicated team members, virtual team experience, team leader status, team status, vision and goals, experience and knowledge, common processes, cultural awareness and cultural adaptiveness) and has been shown to differentiate between successful and un-successful project outcomes.

This research contributes to the management of virtual project teams by providing practitioners with evidence of the existence of a virtual project team typology with the following characteristics that is shown to result in significantly higher rates of project success:

1. *Dedicated Team:* team members are dedicated to the project, having dedicated roles or reporting directly to the project leader.
2. *Virtual Team Experience*: the team members have previous experience of working on virtual teams and have previously worked together.
3. *Team Leader Status:* the team leader is very well known, has achieved recognition and has a very high degree of interaction within the team and within the organisation to which the team belonged.
4. *Team Status:* the team has a strong reputation for having the political power to get things done and is likely to be allowed the freedom to run the project as it wished.
5. *Vision and Goals:* the team has a strong and clearly defined vision, goals and objectives and team members are strongly aligned to them.
6. *Expertise and Knowledge:* team members' expertise and knowledge is considered much more important than job title/position, and team members are strongly encouraged to actively share their knowledge with the rest of the team.
7. *Common Processes:* the team has one set of organisational policies, methodologies and processes.

8. *Cultural Awareness:* the team members are good at recognising the different cultural situations that arise within the team, and understand the different economic, social and legal conditions of the various countries in which the other team members lived.
9. *Cultural Adaptiveness:* team members work hard to adapt to the different cultural situations that occur within the team, are sensitive to other team members' cultural behaviors and this is reflected in the way team members communicate and interact within the team.

The research contributes to researchers' knowledge of virtual project teams by providing empirical evidence of a typology for virtual project teams and establishing a link between virtual team typology and project success.

Keywords: Virtual project teams , Virtual team typology, Virtual team application, Virtual team performance

Organizational Enablers for Project Governance [Publication Queue]

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After decades of investigations into the improvement of project results, the awareness has grown that the way projects are steered from their parent organizations has a major impact on their performance. In line with that the recent years showed an awakening interest in governance in the realm of projects. The present study continues, expands and contributes with new perspectives and insights to this subject, and provides new alleys for further investigation.

Governance is often defined as the way organizations are directed and managers are held accountable for conduct and performance. This applies to all levels in organizational hierarchies and networks, including the corporate level, and therein also projects and groups of projects, such as programs or portfolios of projects. However, looking at governance alone is like looking at a computer system solely in terms of its hardware. Just as a computer only becomes a useful tool when hardware is complemented by software, so does governance only become useful when complemented by its 'soft-side', which is termed governmentality. Governmentality is the way the governing part of the organization presents itself to those who are governed. It shows the attitude governors have towards the people they govern, and it sets the 'tone' for the interaction between them. Moreover, this soft side, or 'art of governance - as Foucault calls it - links the different levels of governance from the project level to the program and even corporate level. Research in governance in the realm of projects has so far mainly addressed the different forms of governance found in different types of projects, but has not yet looked into the origins of the different governance and governmentality approaches. This is done the present study. For that we addressed the following research questions:

RQ1 What are the practices for governance and governmentality in the realm of projects in organizations of different sizes and in different geographies?

RQ2 What are the Organizational Enablers for governance and governmentality in the realm of projects in these organizations?

RQ3 How does governance and governmentality in the realm of projects evolve in these organizations?

To answer these questions we conducted four studies:

1. A two-part systematic literature review with the first part addressing the definition of the concept of organizational enabler. This concept was subsequently applied in the second part on organizational enablers in the project management related literature
2. A qualitative study using six case studies in Sweden and China, with organizations of different industries and sizes to identify governance practices and underlying enablers
3. A quantitative study to a) identify best practices at the levels of project governance, governance of groups of projects, and governmentality, and b) identify organizational wide enablers of governance and governmentality
4. A longitudinal study with the same six case companies to investigate how governance evolves over time and reacts to contextual changes, such as changes in markets, company size, or management.

This approach provided for an initial identification of a large variety of possible organizational enablers, which was successively refined over the course of the four studies to those enablers that are most impactful on the success of the project-based part of an organization.

Early on we encountered the differences between governance at the individual project level and governance of groups of projects. Therefore we split the analyses into three levels: project governance (for individual projects), governance of groups of projects (such as programs or portfolios), and governmentality (the link between these levels).

After 48 interviews in the six case companies and a worldwide web-based questionnaire with 208 responses we derived at the following answers to the research questions:

For research question RQ1, we identified the following best-practices:

- For project governance practices, the use of steering groups and methodologies is almost paramount, whereas the flexibility to adjust organizational and governance structures to the needs of projects is less developed. Important for successful governance is top management support of projects, as well as clearly defined roles and responsibilities for governance, supported by a Project Management Office (PMO).
- Practices in the governance of projects include the alignment of projects and business, the use of company-wide project management methodologies, flexible organization structures, standardization of project selection, reporting, and reviews, and the provision of appropriate media and technological infrastructure
- Practices in governmentality are in granting appropriate levels of autonomy to project managers, and developing them towards self-responsible managers, who think in projects while perceive their organization as an open system with a variety of skills, opportunities and external interfaces.

No statistically significant differences were found by country, industry, and project size, which indicates the large variety in governance in these strata. The interviews indicated a stronger role of process in the governance in China versus a stronger role of individuals in governance in Sweden.

For research questions RQ2 we identified the following organizational enablers for the above mentioned practices:

- At the level of project governance the organizational enablers include a mental Infrastructure allowing for widest possible sphere of action for the project manager, starting from the project, via the project's parent organization, and beyond the organization. Plus the provision of ongoing communication opportunities with managers from other projects, line managers, and external managers for the coordination of the project
- At the level of governance of projects we found that in successful organizations governance is initially established through strong leadership, well established over time and continuously developed, with clearly defined roles and responsibilities.
- Governmentality in the most successful organizations has a culture that prioritizes team work and collaborative accomplishments over individual heroism and provides for a supportive environment for project management, where project managers are encouraged to develop project management in the organization, feel important, empowered and coached. At the same time they are encouraged to get certified and engage with professional organizations

After this 'layered' perspective of governance we took an organization-wide perspective. We refined the concept of organizational enabler further into its constituent parts, which are factors (that cause the enabling) and mechanisms (that support the enabling) and applied this to the entire organization, irrespective of governance level. Using factor analysis we identified five factors: leadership, mental infrastructure, governmentality, flexibility in project governance, and flexibility in the governance or projects. These are supported by six mechanisms: a stakeholder orientation to governance, periodic reviews of projects, programs and portfolios, the institutionalization of governance in terms of reporting systems, methodologies, institutions for project selection and coordination etc., the continuous improvement in professionalism, as well as periodic governance related meetings, and remuneration systems that are aligned between line managers and project managers.

Through regression analyses we identified the following three organizational enabler factors as directly correlated to the success of the project-based part of the organization:

- Leadership, the extend governance is established by a strong leader, maintained and further developed over time.
- Governmentality the mental predisposition of the governors towards those that are governed. Shown through, for example, the level of empowerment, team culture etc.
- Mental infrastructure, the mental sphere of action of project managers, that is, the extent an organization allows information exchange within projects, across projects, within organization and beyond organization, thus the authority of project managers in exchanging information.

These three enablers together account for 20% of the variance in success with the project-based part of organizations.

We applied the same three factors to a different measure of success, this time the success in establishing a governance structure which is accepted and perceived as helpful by the project management community. The three above mentioned factor account

for 40% of this success, whereby the mechanism 'meetings' partly mediates the impact that governmentality has on governance success. It shows the importance of periodic meetings for the establishment and maintenance of good governance structures.
Among the three main enabling factors, leadership weighs approximately twice as important as each of the other two (governmentality and infrastructure). Accordingly leadership can be seen as the ultimate enabler for governance and governmentality in the realm of projects.
For research question RQ3, the evolvement of governance and governmentality we found:

- Contextual changes, such as changes in markets or market share do not lead to predictable changes in governance. However, changes in governance are typically initiated by CEOs and their decision on the changes in the governance of projects. As shown above, leadership is the main driver for the evolvement.
- Changes in company size appear to have a major impact on governance and governmentality. Project governance is well established and accepted in small organizations (less than 250 employees) and large organizations (more than 30,000 employees). But is less developed in medium size organizations. Especially organizations with 251 to 1,000 employees tend to subordinate projects and their governance to the production process, thus unbundle the project in its tasks and feed those into the production process, dispersed over the different parts of the organization, with little or no management and governance at the project level. Looking across all sizes of organizations we see that leadership and infrastructure grows in line with the growth of the company.
- Maturity driven evolvement shows that success in governance and governmentality grows linear with improvements in leadership, definition of roles and responsibilities, mental infrastructure, collaborativeness, and project manager support. Leadership features as the dimension with the largest improvement when comparing less successful with more successful organizations, again pointing to the importance of leadership for governance and governmentality.

From that we derive the following suggestions for managers:

- The need to develop strong leaders to establish and maintain project management and its governance as a way of doing business. These leaders need to be at or have direct access to top management in order to have the authority to change the organization's way of working and the value system.
- Establish a broad mental sphere of activity for project managers. This includes allowing and encouraging project managers to engage with professional organizations, work in standardizing committees, participate in conferences, and collaborate with academic institutions, benchmarking companies, and standards developing bodies.
- Establish appropriate governmentality. Governmentality sets the 'tone' between the governance institutions and those they govern, as well as within the governed society. Most successful organizations control their project managers by the extend they meet established outcome objectives, as opposed to controlling them for methodology compliance, while, at the same time taking a stakeholder orientation in governance. That means establishing a culture of a) mutual trust between the developers of the governance system and the project managers, b) collaboration and team work, and c) taking care of the professional development of project managers.

This study is the first research that ties together project governance, governance of projects and governmentality. The results show the high level of integration between these three subjects in everyday governance. The research distilled the three main organizational enablers from the myriad of possible influences that an organization can have on projects and their governance. Last not least, it provided suggestions for academics to further develop the related theory, and suggestions for managers to develop their governance and governmentality.

Keywords: Governance, Projects, Programs, Portfolio management, Organizational project management

ONGOING RESEARCH

The following projects have been funded through Sponsored Research prior to 2015, and are currently pending completion.

Establishing a Theoretically Sound Baseline for Expert Judgment in Project Management

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Expert Judgment is by far the most frequently referenced tool/technique in the Project Management Body of Knowledge (PMBOK®). It is listed as a tool/technique for 30 of the 47 project management processes (63.8%) – five times more frequently than the next most common project management tool/technique. Despite its prevalence as an important project management tool/technique, expert judgment lacks full description within the PMBOK®. In comparison, such tools/techniques as the critical path method or the probability-impact matrix, which are referenced in only a single specific project management process, are described in detail in the PMBOK®. Thus, an important gap exists in the project manager's PMBOK® toolkit.

This research project will create a "how-to" reference for using expert judgment in project management. For without well-designed elicitation processes, expert judgment is subject to known flaws rendering the resulting estimates inaccurate. When project management processes are based upon flawed judgments and estimates, projects are susceptible to missed deadlines, budget overruns, or failure to meet stakeholder expectations. Therefore, it is critical that we, as project managers, have access to a foundational set of guidelines in order to treat expert judgment appropriately and make more accurate project estimates.

Keywords: Agility, Innovation, Organization change management, Knowledge management,

Translational Science and Its Effects on Organizational Structure and Program Management

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The National Institutes of Health (NIH) have made translational research a priority, profoundly affecting the way scientific research will be conducted across universities and how new knowledge will be applied to improve human health. The need for new and innovative structures within universities to manage and disseminate results is clear. However, the best strategies for organizing university research centers have not been determined and may vary according to needs and cultures of individual institutions. More importantly, the NIH now require that research be conducted on both an inter-disciplinary and inter-organizational basis to expedite discovery and knowledge sharing The implications for program and portfolio management from studying these changes will be most salient with respect to how scientific projects are integrated, managing human resources, communicating within and among projects, and managing stakeholder expectations. In addition, this study will shed light on how scientific project teams can be more effectively managed. Further, the learning from how these organizations approach the challenges presented by this significant shift in focus can be useful for other types of nonprofit firms as well as commercial enterprises facing significant environmental changes. All of the aforementioned areas involve the softer side of Program and Portfolio management. These involve more intense human interaction and rely heavily on the Project Manager's skills of influence and leadership in order to foster open communication and meld the cross interdisciplinary objectives and motives held by project stakeholders as the project cross existing functional and/or departmental barriers. While the remaining knowledge areas (Project Scope Management, Project Time Management, Project Cost Management, Project Quality Management, Project Risk Management and Project Procurement Management) are also important, they lend themselves more easily to well established standards, tools and processes and are therefore success in those areas rely more on the technical ability of a skilled and proficient Project Management professional and less acutely impacted by the challenges managing human interactions and personalities can bring.

Keywords: Organizational change management, Translational science, Project stakeholder management

High-performance capital project front-end: a design commons approach

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This research aims to explore whether a robust design commons can be a superior form of organizing the front-end of a mega infrastructure (capital) project. During the front-end, funders, future operators, regulators, the project supply chain, and planning authorities must work together to define the key strategic attributes of the project including scope (design), schedule, and budget. A design commons approach proposes to set up the front-end as a 'polycentric' organization that is neither wholly decentralized nor centralized, but instead encompasses multiple levels of action and rule-making, a shared governance structure, and local decision-making. Surprisingly, the capital project front-end process shares the structural properties of an Ostrom's (1990) common-pool resource: low excludability and high subtractability. Low excludability means that it is hard to prevent many heterogeneous claimants from influencing the front-end because they will share the single designed artifact in use. High subtractability in turn means that the claimants have different design preferences and priorities for the single designed artifact. Hence this research will explore the viability and potential of applying a design commons approach to organize and govern the front-end.

Methodologically, the research will adopt a hybrid approach and combine inductive case-based reasoning with lab experiments. The fieldwork will be empirically grounded on the front-end of megaprojects that unfold in democratic societies. Hence we plan to study the high-speed two (HS2) project in the United Kingdom, a country with a well-established democratic tradition and a strong property rights regime, and the Delhi-Mumbai industrial corridor in India, the largest democracy in the world, but a country with fragile institutions vulnerable to corruption and nepotism. The lab-based experiments will involve a two-group controlled experiment. The experiment will pivot around a lab-based exercise which will simulate the front-end of a real-world megaproject. The ultimate goal of the research is to develop and validate a contingency theory as to when and where a design commons approach can be a superior form to organize and govern the front-end of a capital project.

Keywords: Megaproject, Design commons, Capital design, Infrastructure

Scaling Agility: Adapting Agile Principles to Large Projects in Large Organizations

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Agile methodologies have been designed in response to the specific challenges of the software industry (i.e. high uncertainty, short development cycle, no physical deliverable, etc.). Although agile methodologies provide flexibility in the software development process, most documented benefits have been achieved through small projects composed of one or a few dedicated self-managed teams. While Agile methodologies seem suited for small collocated teams, there are a number of impediments to the scaling of these practices in large multi-site, multi-customer, multi-project organizations. The last five years have witnessed an increasing number of large organizations struggling to scale from a few agile core teams to an organization-wide implementation of agile methods. The proposed research has the objective to understand how agile principles can be adapted to large organizations managing a portfolio of multi-site/multi-team projects. The qualitative phase of this research is based on in-depth multiple case studies. Three large organizations will be investigated each with a different type of customer relationship. The quantitative phase will seek to validate some of the results from the qualitative phase. The research has already started with a first company, a large multinational with over 100,000 employees, out of which over 25% work in the R&D divisions and use agile methodologies. A second multi-national enterprise in the financial and insurance business has accepted to participate in this research, but data gathering has not yet started. The firm implemented a large number of concurrent software projects for their internal IT customers using an agile approach. Discussions with a number of firms are ongoing to include an additional organization in the study. The outcomes of this research will offer guidance to the project management researchers and practitioners considering Agile methods in other contexts than single team software development projects.

Keywords: Agility, Innovation

Project Management as a Dynamic Collaborative Social Practice: Collaborative Innovation Revisited

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The proposed research addresses the scope for innovation through collaboration amongst project partners, which is a key priority in project management practice. We extend the practice-based perspective that has been adopted in recent project management research and introduce a practicing orientation that focuses on the emergence and dynamism of project management practice. This orientation provides scope to capture the way projects unfold and the way project partners interact, particularly mindful of the uncertainties and complexities that underpin collaborative project management. The analysis will seek to understand the dynamics of collaboration to accommodate uncertainties and the scope for innovation therein. We have access to 1,200 project managers who are currently enrolled on the MSc in Project management and will tap into their lived experiences to understand and develop further collaborative innovation as key project management capability. We have secured University ethical approval and propose a mixed method study that will provide answers to the following two questions: (1) What innovation episodes can be identified from collaborative projects? (2) How might collaborative capability foster such innovations in future project management practice? Our analysis will use suitable qualitative and quantitative research methods and analysis to distil from the data some of the conditions that can foster collaborative innovation. The impact of a greater understanding of the collaborative innovation potential in projects will be established as a key future capability and measure of project success.

Keywords: Collaboration, Dynamism, Innovation, Practice

Community engagement strategies during the construction phase of controversial projects

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It is increasingly important that project managers develop greater capabilities to better manage the social, cultural, political, environmental and economic impacts on proposed construction projects. These challenges are best resolved in consultation with communities rather than in conflict with them. This is particularly important on controversial projects, which are projects that have obtained government sanctioned 'development approval' but not 'community approval'. While a rich body of research and intellectual frameworks exist in the fields of urban geography and planning to understand and manage community concerns during the pre-development approval stages of new projects, current theoretical frameworks that guide community engagement in project management are inadequate. A new and innovative research agenda is needed to guide thinking about the role of local communities in the construction process and is an important research gap that needs to be filled. Within this context, this research aims to assess the effectiveness of strategies adopted by project teams to engage with local communities so as to capture lessons learnt to apply to future projects. Arnstein's ladder of participation is proposed as a framework to better understand how power differentials between the project team and local communities can influence the adoption of community engagement strategies. A two-phase approach utilizing interviews and workshops across four to six case studies in three key cities in Australia is proposed. The data collected will be analyzed in two ways: (1) Thematic analysis is used in phase one to identify key themes and concepts to emerge from the interviews; and (2) content analysis is used in phase two to gain greater insight into the case study workshops that investigated leads generated from phase one. The findings will result in a number of recommendations to guide community engagement practices on future projects.

Keywords: Engagement, Construction, Case study