Project Perspectives

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Table of Contents

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Decision making is everywhere in projects – taking special notice of this job!

Project environments are very often complex and increasingly like that. Even in the cases of rather small and standard projects the conditions can change in an unexpected manner resulting in a situation the nature of which can be classified as a complex one. Research has shown that we use unconscious routines i.e. heuristics to cope with the complexity inherent in objects in question and relating decision making (Hammond, J.S. et al, 1998, The Hidden Traps in Decision Making, HBR). The different biases present in those unconscious processes are pretty well known but difficult to overcome. For executives and other key people in projects these traps are especially dangerous.

We understand the value of effective and least time consuming decision making processes in our projects being almost without an exception all the time under time pressure. On the other hand this seems to produce practice where it is acceptable to rely on fast heuristic decision making that is certainly not foolproof. Our challenge is to frame decision making in a way which facilitates rational thinking in a sensible manner. This can mean different kind of things for different situation – one size does not fit all. One could start by asking questions about the assumptions, identifying hidden agendas and root causes. The main point is to move from pure or almost pure heuristics a few steps towards more rational decision making.

In practice, one could see presence of this in form of transparency and resulting debates which finally can produce improved understanding and, likewise, as an output we get higher quality decisions.

In this issue of Project Perspectives we are directly and indirectly addressing dimensions and appearances of decision making in projects. That challenges and chances of decisions can be approached via decision viewpoints, appearances of project complexity and human aspects. Decision viewpoints are reflected in several papers that are opening the content of value formation and sustainability as a new decision making criteria. Degree of project complexity, its dimensions, resulting unexpected events and managerial choices represent field that has also plenty of explanatory power also regarding decision making. It seems that higher advanced levels of decision making skills require multidisciplinary understanding of this job. For this purpose we need to embrace and acknowledge relevant research results from social sciences and psychology.

It seems that challenges of practical decision making are well known and the essential importance of decision making is acknowledged. However, the procedures and processes of practice do not address decision making in an explicit manner. The decision making is there in the core of actions, engagement and commitment creation, and, building teams and high degree participation. Thus, we should develop skills, practices and understanding of our key people accordingly with respect of decision making.

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Leaders, when are you gonna make your revolution?

Today's decision makers are facing two growing aspirations in their teams: teammates all want to be part of the decision-making process and they commit to the project if it offers significant value for them.

Whether you are the executive of a company, a senior project manager, or the elected representative of a community, you will have to operate a "leadership turnaround" in order to meet these expectations. New management tools are required, but more important, new leadership behaviors and approaches.

This presentation first explains what is causing this need for change. It then describe three case studies showing how this "leadership turnaround" was applied to making decisions otherwise, involving people otherwise and creating meaning otherwise, using multiple approaches such as sociocracy and appreciative inquiry.

The primary mission of tomorrow's leaders is changing. The name of the game is now to help people grow and give the best of themselves.

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This is an updated and edited version of a paper that was first time published in the proceedings of IPMA 2012 World Congress.

"It's not like before!"

These days, I have been attending a new show where I meet with executives, managers, leaders and project managers of all types. I can see from here their look of despair that they do not understand what's going on. I see them shaking their heads and mumbling: "Gosh... It's not like before!"

Some look angry, as if they were making others responsible for their inability to solve the new situations they are facing, whereas others seem a little lost. They look around for assistance and help or for a sign, like the walker who finds himself at a crossroads, without having a clue of where he is. Still others show their weariness and discouragement. They sigh as if all of a sudden, all the misery of the world rests on their shoulders.

The reactions are different, and yet, in the vast majority of cases, these executives, managers and leaders persist in doing the exact same things, while cursing, grumbling, or lamenting, but mostly without changing their habits.

But, if it's not like before, why continue doing the same thing? This is when I like to quote a phrase that sometimes shocks those hearing it: "A little more of the same thing... gives a little more of the same result." So yes - If indeed this is not the same as before, it is my job, as an executive or a project manager, to adapt myself and find new ways to continue achieving my goals.

To start: What, in fact, has ***really*** changed?

What is changing

Complexity and heterogeneity drive change

We are witnessing two major changes, which reinforce aspirations that are so significant that no executives or project managers can afford to ignore. First, is the complexity, of course! The purpose is commonplace: the world around us is becoming more complex. Organizations, projects, processes, and systems are composed of more and more elements, with, as a consequence, more and more interactions and interdependencies.

With complexity naturally comes a second upheaval: the heterogeneity. By introducing more elements into our systems and organizations, diversity multiplies, as well as multiplicity of cultures, value systems, representations and benchmarks.

Some look angry, as if they were making others responsible for their inability to solve the new situations they are facing

Change affect at all levels

These two changes – complexity and heterogeneity – apply at all levels of society. At the geopolitical level: The crisis in the Eurozone is a textbook illustration of the enormous difficulties arising of increasing complexity and heterogeneity. It demonstrates the limitations of traditional approaches to governance.

But we find these two aspects in the heart of private companies as well. We all have examples in mind of global companies facing cross-cultural difficulties, or examples of mergers facing the clash of two different corporate cultures.

We also find these issues whilst managing projects. Consider a development project such as creating a new track for a high-speed train, such as the project in the Aquitaine region, to connect Bordeaux with Toulouse and Spain. Complexity is there of course. Heterogeneity as well, with its countless different viewpoints, variety of stakeholders and multiple competing interests.

But let there be no mistake – A simpler project, such as the integration of sustainable development within a company, will also be confronted with a wide diversity it will need to manage.

Change is going to accelerate

Complexity and heterogeneity literally become explosive when combined with two accelerators. The first accelerator is the continuously increasing level of education in our society. With levels of skill and expertise that rise, the refusal of authoritarianism and decisions imposed by others also increases. This past summer, it was not surprising to see that the average education level of the "indignants" of the Puerta del Sol in Madrid, Spain was especially high.

The second accelerator is the progression of individualism that leads to the need for consideration of individual interests and often to their precedence over collective interests.

Two growing aspirations

The changes we have described nourish and strengthen two aspirations for any person facing a decision, a project, or a change of any kind, and they are:

- Wanting to balance collective interests with personal ones ("what's in it for me")
- Wanting to be part of the decision.

As we explained before, we expect to see signs of these aspirations at all levels. At the geopolitical level, this is the key message of the "Arab spring" of 2011 and the Tunisian revolution. At the political level, this is the call for additional decentralization we witness in all local authorities.

At the company level, the title of two recent books express the necessary evolution of managerial models, particularly regarding the integration of employees in the decision-making processes. Their evocative titles show the urgency of this development. The French version of the Gary Hamel's book is titled ***The end of management***, the original title was ***The future of management***. French management expert, François Dupuy chose to give an English title to his last book: ***Lost in Management*** (éditions du Seuil). No wonder the managers I talked about at the beginning of this paper look like Bill Murray in the movie, ***Lost in Translation***!

But look closely... Don't we have the same scenario in our families? Do you think our kids do not want to be part of the family decisions? Don't you think that they want to balance family interest with their own? Advertising agencies know the important role that children can assume in the decision to buy a car for example:

These two growing aspirations apply to all levels. Managers will have to learn how to deal with this, but parents will likely have to learn it too!

The late models and illusions

Considering these two strong aspirations, and truly taking them into account will require abandoning the traditional models of management.

C2 Management is over

The time for autocratic leaders is coming to an end. This is true for heads of states as well. This is also true for business leaders and project managers who

The last type of leader: the democrat. This person no longer exists in the business world.

thought they could hold full power, decide for others, and impose their choices on their entire organization. In managerial terms, it is the end of the mode "C2 Management", which is to say, the "command and control", terms of military origin. This is the end of the project manager who alone, structures the project, assigns responsibilities, distributes tasks to be performed, and monitors their implementation. You may say that such leaders are no longer in business. Allow me to refute this, because I meet them often.

Charisma is not enough

Some authoritarian leaders felt adding charisma would be sufficient. These leaders often have a clear vision of where they want to go and explain that vision to all those who want to hear. They turn it into objectives, and because they understood that the world was changing, they delegate.

These leaders are an improvement over C2 leaders. They do not delegate at the task level, but at the target level, thereby giving a little bit of autonomy to their employees. They are proud to practice "management by objective." And yet ... these leaders are then also suspended. They added charisma and delegation to their manager's outfit, but they still are authoritarian, anchored in a decision process that can only go in one direction: from top to bottom. In doing so, they are not really taking into account the aspirations we developed above.

Participatory management is often an illusion

Some have understood this and thought they should add new accessories to their manager and executive suits, so they disguised themselves as teachers. They believed in adopting a "participatory management", as others have believed in adopting "participatory democracy" and make it work. The idea is laudable and interesting.

But, unfortunately, in the vast majority of cases this is only another illusion. Indeed, putting a "suggestion box" available to project team members, or organising discussions about the vision and goals that come from above, does not change the decision-making process. At best, it makes it look nicer. In any case, we can't resolve the real problems that are posed by the confrontation of collective interests and individual interests, or the issue of competing interests between different teams (such as production and quality or commercial and customer support).

The last type of leader: the democrat. This person no longer exists in the business world. By organising referendum to determine which the majority opinion was, he missed his targets and got fired!

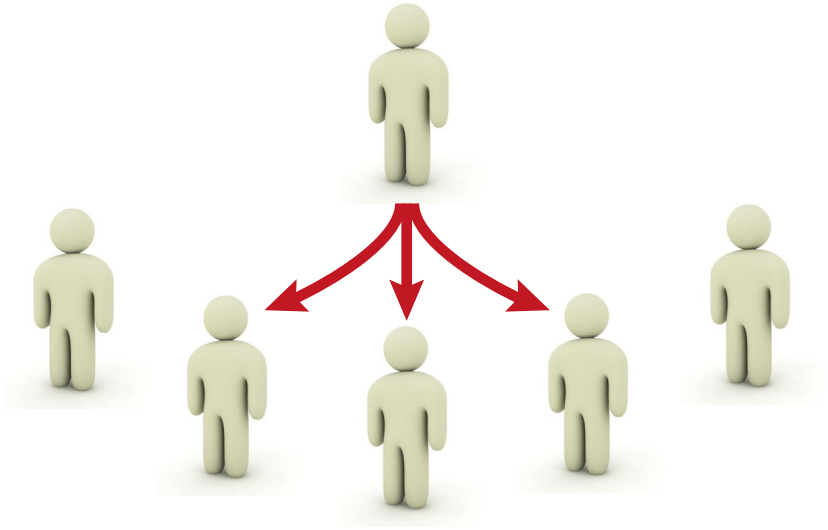

Figure 1. Information flows downstream

The revolution of leadership is now

A leadership reversal is needed

In our companies or communities, the revolution of the leadership is for now! This is the only way to meet the aspiration of involving stakeholders in decision-making process. This is the only way to take into account individual interests as collective interests. I use the term "revolution" deliberately and literally. It's a real turnaround that our leaders, managers and executives must operate.

As evidence, let us look at some words from the vocabulary of today's decision maker. First, he or she will talk about the need to "make people adhere", whether it is to his or her team, company, or fellow citizens, to a common and shared vision. He or she will still speak of "give meaning" to the change he or she is about to manage. He will seek to "motivate" his or her troops. Finally, he will talk about "empowering" his or her managers, teammates and employees. And during all this, he or she will work hard to "manage stakeholders".

Look at these sentences carefully because they are telling. The subject of each of these verbs is the leader himself. The original intention was to involve others, to make room for everyone, and to make sure everyone ends up finding his or her own way within the team initiative. But, in fact, it is merely a cover or a disguise. The means and the words chosen simply show that nothing has changed in the end: the information still flows downward and decisions are still made at the top and spread downstream.

The revolution to operate is to reverse these sentences. The goal is to make the subject of these sentences – the actor of these verbs – no longer the leader, but the team member him or herself, the employee of the company, the average citizen. The question is not to focus on the leader to "make people adhere". The focus is that people "decides to join" the initiative, "discover the meaning" of the project that is being proposed, "get involved" in its realization, and "take responsibility" for its implementation. Regarding the stakeholders, the reversal is not to "manage then", but for them to "agree" to the project and participate in discussions and decisions.

Sociocracy and dynamic gouvernance

In short, this change revives the word sociocracy invented in the 19th century by the French sociologist, Auguste Comte.

The autocrat has sole power. In a democracy it is the people who have the power. In sociocracy, governance is provided by the entire social body, that is to say, by the various related persons, and thus interdependent of each other. Americans, who do not like words that begin with "social", describe this with the words "dynamic governance".

It was not until the 1960s that sociocracy became operational, with the work of Gerard Endenburg. Endenburg is a Dutch engineer who inherited an electrical engineering business from his father. After a few years, marked by deep conflicts within the company, he decided to work to improve its organization. He combined his work with Kees Boeke, an educator of whom he had been a student. The objective was to implement sociocracy, this dynamic governance, with the central concept: no decision can be taken while argued objections remain.

To achieve this, Endenburg develops four operational principles that are extremely simple:

- The circle: Within a sociocratic organization, each work unit belongs to a traditional hierarchical structure, but this work unit also consists in a "circle". Operational issues remain treated by the traditional hierarchical structure; however, policy issues are dealt with within the circle. For example, one can imagine a project where all people responsible for deliverables are together in a circle. They decide on the strategic directions that should be taken. Once decisions are made, executions are carried out by the operational manager of the specific deliverable. In sociocracy, everyone belongs to at least one circle.
- The double link: Each circle is connected to the upper circle by two different people. The line manager on the one hand, and a representative delegated by the circle on the other hand. He or she can grant or withhold its consent on decisions taken at higher level. This double link provides two-way communication. With the double link, it is not possible to make a decision that condemns the rest of the organization or the project to failure.
- Consent: Decisions are made based on the consent of all. No decision can be taken while a participant makes a reasonable and argued objection; however, an objection commits its author to actively look for the solution, along with the entire circle. The goal is not to be all in agreement (and to achieve consensus), but that no one object (obtain consent).
- The election without a candidate: The skills and qualities needed to be a good candidate are different from those needed to be a good elected representative! And rare are those who have both! The last principle of Edenburg's implementation of sociocracy addresses this dilemma. In sociocracy, elections do not require candidates. When specific responsibilities need to be assigned to someone, every member of the circle makes his or her suggestion and the person is chosen by consent from all members of the circle.

To summarize sociocracy in one sentence : it is about learning to reconcile rather than choose, learning to switch from "or" which divides and separates to "and", which brings together; and associate, to move away from the "yes but" toward the "yes and".

Figure 2.
Auguste Comte (1798 - 1857)

Figment or reality?

Recently, someone told me: "sociocracy is a figment of the imagination!" He's wrong. Sociocracy is a legal structure in The Netherlands. More and more organizations operate with systems of governance dynamics. Local authorities, such as Communities of Commons, have adopted such principles to strengthen democracy within their territory and involve citizens in the development of a development project.

On the contrary – Not only it is not a figment of the imagination, but I believe, it is vital and necessary. Today's leaders who will not evolve toward sociocracy will face resistance and strong opposition.

I now want to share three examples to show how this "leadership reversal" can solve particularly difficult situations.

Three Case Studies

Case 1: Déciding otherwise

A Community of Commons wants to create on its territory a mini "cluster"; these now famous structures bring together companies, research centers and educational institutions. The idea is to create a center of expertise that builds upon existing structures and entities and leverages the expertise and culture of the territory. My role is to bring together stakeholders and bring them to jointly develop the project vision, co-construct the architecture, agree on objectives, and commit to a roadmap for implementation.

Stakeholders are a "circle". Everyone has the same status: the president of the Community of Commons, other elected officials, business leaders, heads of trade chambers, researchers, teachers, technicians. There is no difference in status. The project is the central concern, not the "leader". The circle meets several times. The meetings are called "summits": they are the important venue, structured to allow in-depth discussions, which lead to collective decisions and commitments.

Co-construction is a nice idea but it does not come naturally. We must begin by "confusing" the participants, so they abandon the representations they may have about each other, or prejudices they have on the subject, in order to open the field of possibilities. This is especially true when one meets people from different organizations, who are strongly influenced by their own culture. We must organize meetings for participants to share, discover and develop an appreciation of each other, focused on the strengths that each brings to the building community. It is then necessary to establish a collective writing exercise that allows each to really put his personal imprint on the collective achievements, participate in developing a shared vision, and find where he or she sits in this vision. We must then go deeper into detail, while maintaining the spirit of co-construction, and avoiding the usual trap that consists of delegating some of the detailed designs and expanding the

Figure 3. Sociocracy at work and leadership reversal

link between authors and their work. And then, we must make choices and decisions, and prioritize.

At each stage, what's important is not to apply a recipe, but use approaches that enable one to stay faithful to the spirit of co-construction. In this example, we used the "six thinking hats", by Edward De Bono (1985), to bring out all aprioris on the project in order to treat them rationally. Appreciative Inquiry (a methodology initiated by David Cooperrider (2003)) enabled us to then build a vision of the cluster, based on the region's assets and key players. Detailed design phases were conducted through "World Café", a series of highly mobile and dynamic roundtables, which allow everyone to "put his two cents" into a process of gradual development.

After a few months, we had a vision, architecture, and nine goals for the project deliverables in order to put into implementation. Participants were satisfied with their work. However, for me, it lacked the crucial step: that of prioritisation. I now know from experience that it is relatively easy to agree on common goals. However, it is very difficult to prioritize them collectively. This requires making choices and acknowledging the facts that some are more important than others. This may revive the struggle for power and influence. In the past, I've seen a beautiful co-constructed building collapse in an instant at that stage. It was at that stage that I found appropriate to adopt one of the principles of Edenburg sociocracy: the consent based decision.

The experience is instructive. I asked Hubert, one of the participants, a few days before the summit, to make an initial proposal for prioritizing and allocating nine goals into three short term goals, three medium and three long-term. He worked on it and told me "It's obvious! It will not take us long to agree on it!". In opening the summit, he presented his colleagues with his original proposal. I then invited the participants to ask clarifying questions needed to understand the logic of this initial proposal. Hubert was surprised that after all this work together, what was obvious for him may not necessarily be so for his partners. Once questions were answered and clarified, I initiated a round table to get feedback from each participant. At this point, I was careful about avoiding controversy. My goal was to make sure everyone could react to the original proposal and explain his or her views. After the round, I ask Hubert if he wished to amend his original proposal to reflect the feedback and he made some changes. I then asked all participants if they had reasoned objections to make. We wrote the five of them down. One by one, we took those objections and tried to address them. The process is eased by the fact that those who object are actively looking for solutions. The first objection deals with reordering two goals. Solving the second objection makes the last one vanish. The next two disappear after fine tuning the scope of each objective.

This step, supposedly obvious, took the whole morning! This is the price to pay for a solid decision, which leaves no area for doubt, ambiguity, or resentment and leads to a strong commitment from the stakeholders. The decision time is essential, and should be taken.

Case 2: Discovering meaning otherwise

The second managerial turnaround. Many books deal with the subject of meaningful work, and we talk more and more about managers as "meaning givers". But as Eugenie Vegleris exposes in her book Managing With The Philosophy (Editions d'Organisation) (2006): "The term 'giving meaning' is philosophically inaccurate. Meaning cannot be given, it is discovered and built".

I remember being called by a company CEO who had just invested 6 million euros in building a new plant. The investment was designed to reduce the annual market launch of a seasonal product by 75 percent. Four times faster to ensure receipt of the product, grading, quality control, sorting, packaging, storage, traceability. Dividing any process time by four is not an easy task. Everyone can guess what it takes in term of changes, new tools, process redesign. The impacts for employees are huge. The question of "meaning" of these changes, as employees see them, is crucial to their commitment.

In our case, the employees began to organize resistance, claiming that they had inadequate tools, were unable to meet the new requirements, were constantly asking for improvements in working conditions and were refusing to work on the new site. When I asked "Do employees understand the meaning of the changes they are forced to face?" the CEO responded "Sure! We have not stopped communicating on the target of 4 times productivity increase." You probably notice that this is not the answer to the question. The question is not centered on the manager and his team ("Have you communicated?"), but on employees ("Do they understand?"). They are asked to go four times faster to prepare boxes of products that are stored there for a whole season. Did they understand that? Does it make sense to them? What do they think about these changes, their rationale, their consequences, their business benefits? What do they understand as the implications for themselves, on the individual level? Do they know the advantages as well as disadvantages?

In designing the project, leaders followed a path of intellectual thinking and development. It probably took a lot of time (several months?) to gradually mature the decision. The same path must also be travelled by employees. It is useless to tell them the conclusion, but it is necessary to get them on the journey and invite them to discover for themselves the direction of the project, which is what we did with all employees at this factory. For two days, we brought them together and stimulated their thinking on the journey of rediscovery of the company, its mission and its projects.

I remember precisely the time when the breakthrough came – It was 3:30 p.m. on the second day. Suddenly, the group had just grasped the incredible competitive advantage that this increase in productivity brought. Suddenly, they were able to see the impact it had on each one, on the sustainability of jobs, on the development opportunities that the project was opening for each of them, and on the pride of becoming an industry leader.

Fifteen days later, I walked through the factory. The very same people who before were unplugging the new tools "that screw-up all the time", were the ones wanting to show me, with understandable pride, what they could do now, and how it helped their colleagues succeed in their mission.

Meaning cannot be given! It has to be discovered.

Case 3: Involving otherwise

How do we "motivate ?" Again, a reversal is required. Motivation that managers most often seek to raise is the extrinsic motivation: that which is drawn not from the activity itself but that is external to the activity (eg obtaining a reward). However, the strongest motivation is intrinsic motivation, that which is drawn directly from the activity itself. One does not exclude the other, but research shows that extrinsic motivation may kill intrinsic motivation. Building a sustainable involvement of actors in a project can be built on intrinsic motivation. To do this, it is no longer a question of knowing to motivate your team but a question of thinking about ways to get your team involved. The distinction is significant.

In 2004, a few stakeholders in the fruit and vegetables sector in Aquitaine (one of the primary economies of this region) came to us. This industry was in decline and one of its leaders strongly claimed that "decline is not a project." They wanted to create new dynamic and to trigger new aspirations to become entrepreneurial in this domain.

Initially, they imagined starting a project with some key players, thinking of a "commando" like operation, hoping that it would gradually snowball and change the entire field. They knew that an entire sector does not move unless all stakeholders engage in collective action, but they did not know how to get there.

Our challenge was to bring together 100 industry players, for three days of talks, which would subsequently be referred to as the "Dax Summit". Needless to say, sending 150 invitations was not going to get us to reach our goal, especially when one knows the state of despair that exists on farms. It was therefore necessary to build an engagement strategy.

This was one of the first times that an Appreciative Inquiry of this magnitude was conducted in France. We formed a small team to conduct appreciative interviews, an interview style that opens fields of exploration for the future, leveraging the successful past experiences. We sent our interview team to meet with 110 industry players to talk about their successes, their key achievements, their pride of feeding people with good-quality products, the strengths and assets they had developed, as well as all that remains to be built.

Remembering the emotion during some of these meetings and the tears I've seen shed, I have no doubt we touched on the intrinsic motivation of these women and men. A few weeks later, 90 of us gathered at the Dax Summit, to start building the renaissance of the industry.

Involving is not convincing – It is helping others to find out what drives him.

Building projects of the future

To build future projects, the project manager should take into account the new aspirations of people. Whether to merge two companies or two information systems, to cross a territory with a new high speed train, or start thinking "sustainable development" in the company, he will have to acquire new tools and new ways of doing things. They are not lacking: from Appreciative Inquiry to Sociocracy, from World Café to the collaborative writing process we discussed here.

But tools and methods are nothing if they are only seen as tips and tricks. To accommodate these aspirations, the leader must reflect deeply on the evolution of its role. He or she must be able to make the managerial turnaround we discussed and his or her primary mission becoming: To help people give the best of themselves!

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Patrick is also involved in his community and is an elected member of the Aquitaine Regional Parliament. As a regional advisor, he deals with innovation, industry and agriculture.

Patrick has always been attracted by exploring new territories. He spent 15 years in project management in the semiconductor industry, in Europe, Asia and the United States. He then managed the European strategic consulting group of an engineering company. His background led him to a strong belief: beyond tools and technologies, methods and processes, managing a project requires first to care about people.

Value Management Beyond Earned Value

In project management, value concepts are normally limited to earned value related to fulfillment of project scope. This paper presents a business-by-project concept. The objective is to optimize project life-time utility. The utility function includes both monetary utility - normally Net Present Value (NPV) - and qualitative utilities. Project utility is included as a decision parameter encompassing the traditional parameters time, cost and quality. Decisions support is based on a Multi Criteria Decision Analysis (MCDA) technique. The uncertainty dimension is introduced in both quantitative and qualitative parameters. Management tools based on the concept have been applied in several projects, primarily in early phases. Examples of use are presented. To successfully implement value management in projects, active support from management and in-depth ownership among all key actors is essential. The value management concept presented, represents a general applicable concept even though it has been developed for use in construction and infrastructure projects.

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This is an updated and edited version of a paper that was first time published in the proceedings of IPMA 2012 World Congress.

Introduction

The objective of the value management concept presented in this paper is to improve value creation in projects. The context of value management here is decision making in projects, especially in relation to conceptual phase evaluations. An overall value management challenge in most real world projects is to balance quantitative values (ref. "hard" paradigms) and qualitative values (ref. "soft" paradigms). The term value includes both monetary and qualitative values. Monetary value is measured by Net Present Value, while qualitative values are expressed by measurement scales and utility functions. Utility functions include decision relevant uncertainties in this value management concept. Utility value equivalents are used when combining quantitative and qualitative values.

Earned Value and Life Cycle Value Management

Earned Value in Project Control

In Project Management the concept of earned value has been used for several decades. Earned value is defined as (PMI 2004):

> *The value of work performed expressed in terms of the approved budget assigned to that work for a schedule activity or work breakdown structure component. Also referred to as the budgeted cost of work performed (BCWP).*

Earned value management: *A management methodology for integrating scope, schedule, and resources, and for objectively measuring project performance and progress. Performance is measured by determining the budgeted cost of work performed*

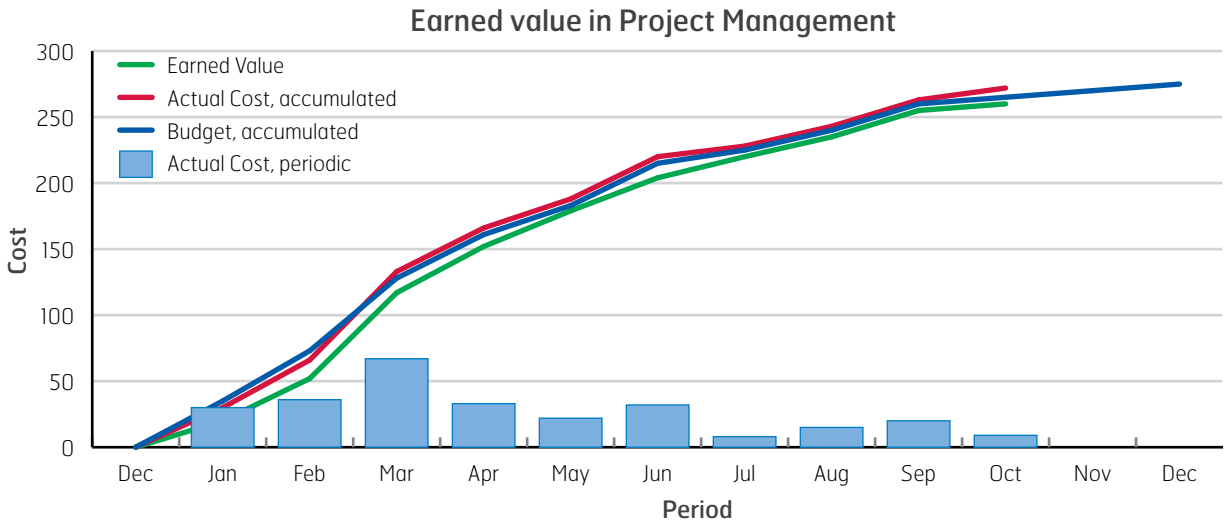

Figure 1. Earned value in project control

(i.e., earned value) and comparing it to the actual cost of work performed (i.e., actual cost). Progress is measured by comparing the earned value to the planned value. Earned value as control parameter is illustrated in figure 1.

The earned value concept relates to the completion of project outcome (object, system). This is a good starting point, but to increase value creation the value management concept must be developed further to include all relevant values in projects.

Value Management in Corporate Management

Value management in corporate management is based on building a common set of values that everyone in the company has ownership of. In this regime individual employees take greater responsibility for the overall picture and feel ownership of the company's goals, mission and vision. In value-based organization leaders deliberate release of power and control to enhance value creation, but it requires a high degree of maturity of all actors. Value based management does not mean that you do not have rules and goals, but it makes it possible to reduce the focus on rules and control. Good economic results come because everyone has ownership of the organization's goals and how they will be achieved.

Next section deals with implementation of value management in project management.

Value Management in Project Management

The concept presented in this paper relates to value creation in the whole life cycle, including operational phase where the project result is used to produce value for the owner and other stakeholders (Jordanger 1998). From traditional project management point of view the concept of earned value of course is important. However, from the project owner's perspective life cycle value creation is critical and most important. Based on this, project management should include life cycle value management.

In figure 2 all cash flows are integrated in an overall quantitative objective function including all quantitative economics. Future represents uncertainties that the project has to face and manage to improve value creation. This is the first step towards life cycle value management in projects. Optimization of NPV within this realm and given external framework conditions has a huge potential of increasing value creation. One main observation is that both opportunities and risks have to be included in the evaluation of future uncertainties. The term uncertainty management is used for managing risks and opportunities. One additional important aspect with the concept illustrated in figure 2 is the integration of uncertainty management and value management. The importance of this integration is also stated by others (Green 1999).

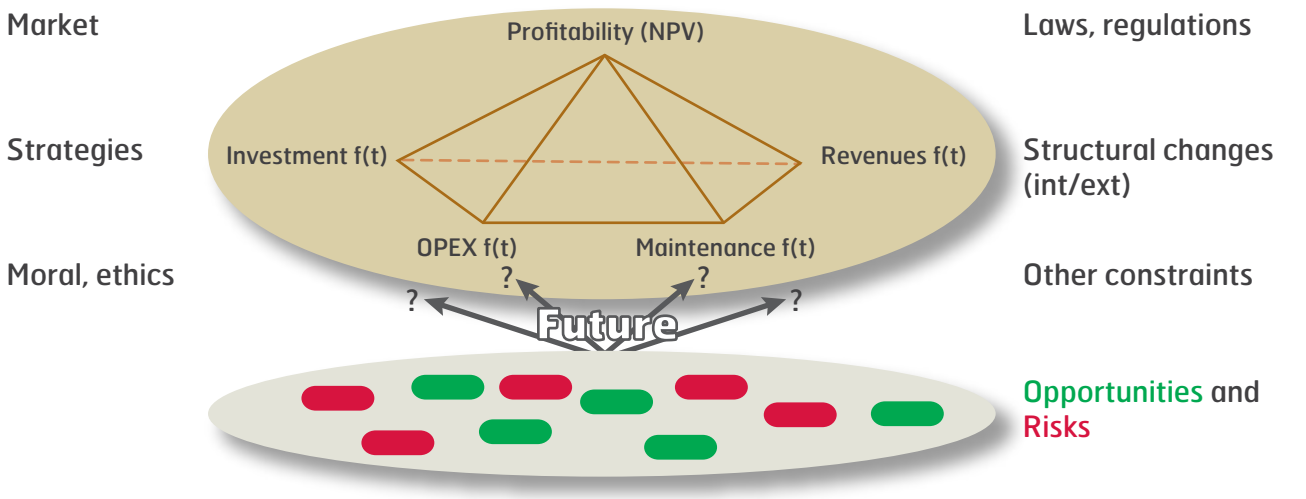

Figure 2. Total quantitative values and contextual factors

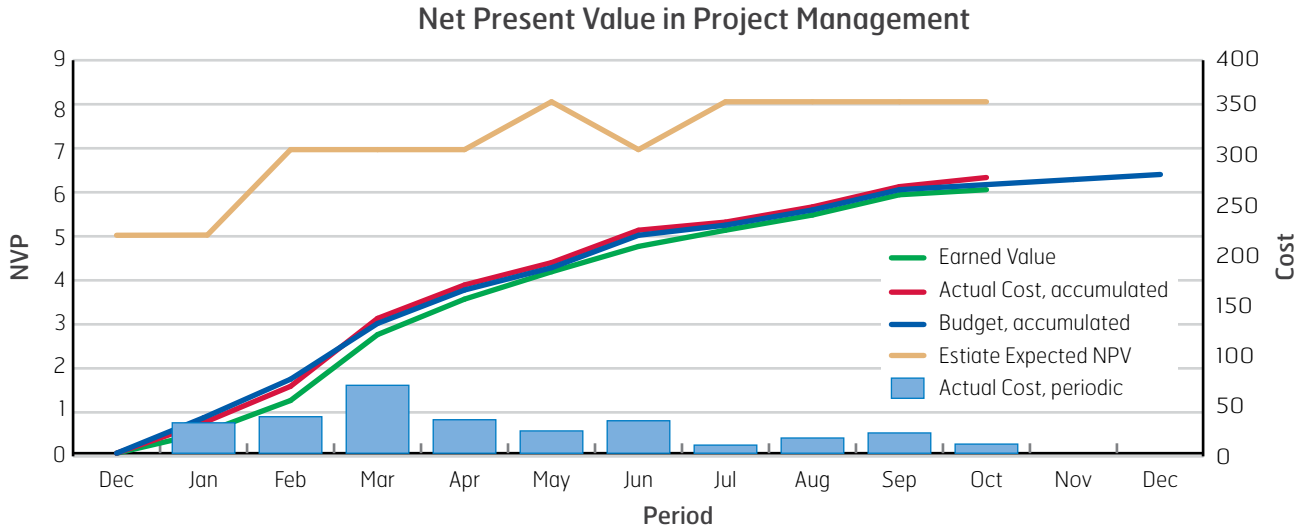

Figure 3. Quantitative life cycle economics included in project control

Figure 3 illustrates how NPV can be included in project control. NPV as a control parameter does not replace earned value, but is a supplement representing the owner's overall project objective.

This is a further step in perfecting project management. Value management in project planning and execution relates primarily to discrete decisions, which causes the steps in the NPV estimates.

The value of estimated expected NPV is normally revised at decision points in the planning and execution phases of the project. The value of expected NPV is based on deterministic calculation or preferably stochastic simulation.

The next section deals with including qualitative values in the value management concept. The main focus is value analysis and –management as part of decision processes in early project phases.

Value Management Decision Processes

In real word projects, the value management concept must balance quantitative/"hard" and qualitative/"soft" elements. Combining quantitative and qualitative values in decision making creates new challenges. Balancing project specific qualitative values against values measured in monetary terms is complex. No general evaluation rules can be applied, since no common unit of such values exists. This allows for subjective assessment and potential conflicts between stakeholders with different interests and priorities. These challenges should not be underestimated. An open process with mutual respect between decision makers is essential.

One way of combining quantitative and qualitative values is presented next. Key words are utility functions and monetary unit equivalents.

Utility Functions implemented in the Value Management Concept

Projects at an early stage will normally include assessments of alternative solutions to satisfy specified requirements/needs. Often the situation is characterized by a high degree of complexity and uncertainty.

Multi-Criteria Decision Analysis (MCDA) is a discipline aimed at supporting decision makers who are faced with making decision among the alternatives. MCDA aims at deriving a way to come to a compromise between conflicting objectives in a transparent process. A central focus in this paper is applied MCDA and practical use of utility functions in real life projects. Utility functions are implicit in MCDA. MCDA uses a terminology which distinguishes between utility functions and value functions. If the analysis takes into account that the external factors may be uncertain, the functions to express preferences are called utility functions. If uncertainties are not included the functions are called value functions (Jordanger et al. 2007).

In most evaluations of alternatives it is, in addition, appropriate to include the uncertainty dimension when evaluating the decision criteria. Choosing alternatives according to the principle of expected utility is not always recommended. This additional realism caused by real life uncertainties creates additional complexity in alternative analyses. But there are available tools in the toolbox; combining MCDA, (linear) utility functions and Monte Carlo simulation.

First, the steps in the applied MCDA process (Jordanger et al. 2007):

1. Problem analysis and structuring; Definition of framework and external conditions, identification of stakeholders, establishing an evaluation group, definition of objectives, evaluation criteria and weighting of these, and finally definition of alternatives.
2. Development of evaluation model; Development of model structure, goal hierarchy, modeling of utility functions, calibration, verification and validation of model.
3. Evaluation of alternatives; Qualification of alternatives, evaluation of score for each criterion for each alternative and, finally transformation of score to utilities.
4. Evaluation of uncertainty/risk; include relevant quantitative and qualitative uncertainty
5. Concluding evaluation; produce final ranking of alternatives based on values. This step also includes sensitivity analyses to investigate robustness of ranking, especially related to subjective, qualitative criteria. Finally, evaluation process and basis for the evaluation is documented to ensure traceability of the whole decision process.

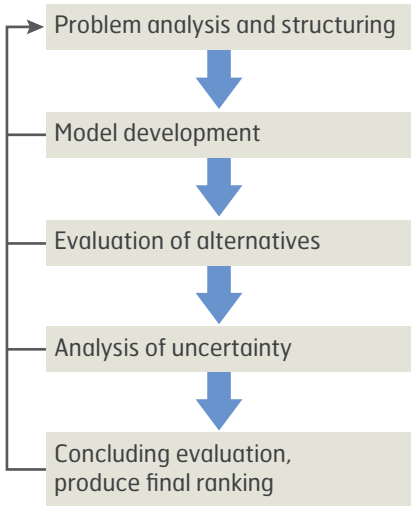

Figure 4. MCDA process (Jordanger et al 2007)

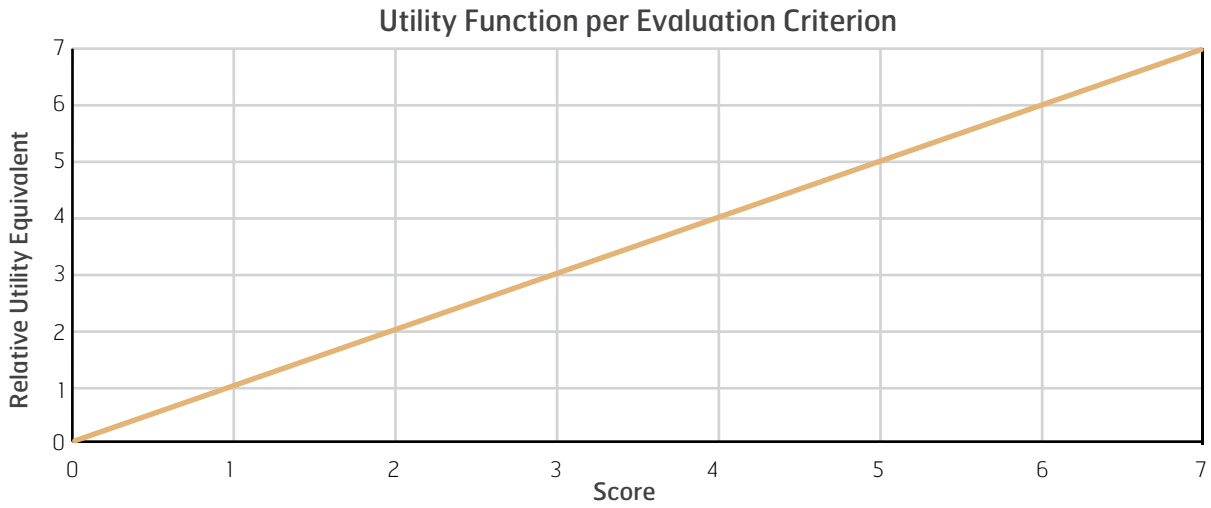

Figure 5. Evaluation criteria and utility function. Example

The aim of the utility function method is to mathematically transform the scores on an ordinal scale to equivalent values on cardinal scale, i.e. the value is measured in *utility equivalents*. Utility functions may be linear or non-linear. This transformation allows for the application of a new set of methods and tools that are used on a broad basis in quantitative economic analysis, including uncertainty analysis.

Example of Utility Function based Method and Tools

The following example describes an analysis from a real life project. In this project, utility functions are used in social economic evaluations related to building concepts and localizations. The same methodology and tools can be used in all types business projects and decision processes in general.

Step 1: Problem analysis and structuring

Based on defined assumptions and constraints, evaluation criteria and weighting are defined, see table 1.

Criteria	Weight
NPV	50 %
Functionality	20 %
Flexibility	15 %
Community development	15 %

Table 1. Evaluation criteria and weighting, example

- NPV: Quantitative, weight 50 %
- Functionality: Qualitative, weight 20 %
- Flexibility: Qualitative, weight 15 %
- Community development: Qualitative, weight 15 %

One criterion is quantitative (NPV), the rest are qualitative. Evaluation criteria and weights are normally decided by the evaluation team in consultation with the decision maker.

Step 2: Model development

Determine the measuring scale to be used and assign utility function to each evaluation criterion. In this example a measurement scale 1-7 is used and all utility functions are assumed to be linear (the tools used also allows for non-linear utility functions).

For each criterion, a preliminary interpretation of each step on the measurement scale is produced.

Calibration of the evaluation model. Calibration of the model is carried out before analysis of each alternative. The purpose is to examine whether the model produces the desired response from given weights and utility functions. Calibration is normally carried out with the NPV criterion as a reference. For example, if the *Community development* criterion score is increased by 1, how much must the NPV be changed to get the same effect on the total score? The answer in this example is 34 MNOK.

To balance each qualitative criterion against monetary value, the term *willingness to pay* (WTP) is introduced. One must ask the question: Should this increase in *Community development* value be considered to be equivalent with the monetary value 34 MNOK (no more, no less)? If the answer is yes, keep the weights. If not, adjust the weight percentages until the desired response is achieved.

All qualitative criteria should be calibrated against the NPV. This will in practice be an iterative process. After this calibration step, the monetary equivalent values of each step on the measurement scale are defined for all criteria. And important: *These equivalent values are used when, on the next step, scores are assigned to each criterion for each alternative.*

Sensivity evaluation	Change in score	Change in total score
NPV		0,15
Functionality	0,0	
Flexibility	0,0	
Community development	1,0	

vs.

Sensivity evaluation	Change of NPV	Change in score	Change in total score
NPV	-34	0,309	0,15
Functionality		0,000	
Flexibility		0,000	
Community development		0,000	

Table 2. Sensitivity analysis, example

Alternative 2, New building north

Simulated cost	Min	Most likely	Max	Simulated
Investment cost	288,0	360,0	432,0	360,0
Extraordinary rehab.cost	3,0	15,0	27,0	15,0
Value of building site	0,0	5,0	10,0	5,0

Periodic investments	Value	2009	2010	2011
Investment cost	360,0	10%	40%	50%
Extraordinary rehab.cost	15,0	67%	33%	

Cash flow, Alternative 2	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2025	2030	2035	2040
Investment cost	36,0	144,0	180,0													
Extraordinary rehab.cost	10,0	5,0														
OPEX	3,0	3,0	3,0	6,0	6,0	6,0	6,0	6,0	6,0	6,0	6,0	6,0	6,0	6,0	6,0	6,0
Value of building site			-5,0													
SUM costs	**49,0**	**152,0**	**183,0**	**1,0**	**6,0**	**6,0**	**6,0**	**6,0**	**6,0**	**6,0**	**6,0**	**6,0**	**6,0**	**6,0**	**6,0**	**6,0**

NPV Alternative 2 **436,6**

Table 3. Cash flow profiles for NPV, example

Alternative	NPV			Functionality		Flexibility		Community development	
	Norm. value	Score	Norm. score	Score	Norm. score	Score	Norm. score	Score	Norm. score
Alternative 0	401,7	4,5	4,3	2,0	2,0	1,0	1,2	2,0	2,2
Alternative 1, Rehab.existing building	398,3	4,6	4,4	2,0	2,0	1,5	1,8	2,0	2,2
Alternative 2, New building north	436,6	4,2	4,0	6,5	6,6	5,0	6,1	5,0	5,4
Alternative 3, New building east	440,4	4,2	4,0	4,0	4,1	5,0	6,1	4,5	4,9
Alternative 4, New building south	524,9	3,4	3,3	5,2	5,3	4,0	4,8	5,0	5,4

Table 4. Scores per criterion and alternative, example

Step 3: Evaluation of alternatives

Assign score for each criterion and alternative. Now, the life cycle cash flow profiles are defined. Uncertainty in all economic parameters are analysed and modeled. For investments, there is an underlying cost breakdown structure. In this example there are no revenues. Eventual revenue profiles are modeled in the same way as investment costs.

The scores for each alternative are presented in the table 4. These scores are the results from a group process in the evaluation team.

The score of quantitative criteria (here NPV) is *calculated* since this criterion is measured on a cardinal (ratio) scale. The spread of the calculated NPV score reflects the spread on NPV values.

The alternatives are evaluated on a relative basis, not "the best in the world". Assignment of scores is based on the calibration above and assessment of WTP. One consequence of the relative approach is that all scores should be normalized so that the average of all scores is equal to the middle value on the measurement scale (Jordanger et al 2007). One reason for normalization is also to prevent that eventual entry of systematic high / low score for one evaluation criterion undermine the weights of the criteria.

Step 4: Analysis of uncertainty

To arrive at a realistic value for the total economy it is recommended to perform an uncertainty analysis in which all the relevant uncertainties is identified and quantified. In calculating the NPV, a risk free discount rate should be used. The table 5 shows only the aggregated uncertainties. *Min* represents P10, *Max* represent P90 and *Most likely* represents P50. Other costs are modeled in a similar way.

Scores on qualitative criteria are also in reality uncertain. As mentioned above, these scores are the results from a group process. This process may have (at least) two alternative strategies: 1) Discuss and reach consensus or 2) Discuss, include differences of opinions (among equals) and express differences as uncertainties. Include these uncertainties in further evaluations. Strategy 2 is recommended, since the alternative strategy will suppress important information for the final decision maker.

In this example, there was agreement in the group about most scores. There is however a spread in scores related to *Functionality* of alternative 1, 2 and 4. There is also a spread in evaluation of *Flexibility* of alternative 1 and 4. These spreads are modeled as stochastic variables with the same parameters as used for modeling cash flow uncertainties.

Simulated cost	Min	Most likely	Max	Simulated
Investment cost	288,0	360,0	432,0	360,0
Extraordinary rehab.cost	3,0	15,0	27,0	15,0
Value of building site	0,0	5,0	10,0	5,0

Table 5. Uncertainties of cash flow elements, example

Alternative	Functionality				Flexibility				Community development			
	Min	Most likely	Max	Sim.	Min	Most likely	Max	Sim.	Min	Most likely	Max	Sim.
Alternative 0		2,0		2,0		1,0		1,0		2,0		2,0
Alternative 1, Rehab.existing building	1,5	2,0	2,5	2,0	1,0	1,5	2,0	1,5		2,0		2,0
Alternative 2, New building north	6,0	6,5	7,0	6,5		5,0		5,0		5,0		5,0
Alternative 3, New building east		4,0		4,0		5,0		5,0		4,5		4,5
Alternative 4, New building south	4,5	5,0	6,0	5,2	3,0	4,0	5,0	4,0		5,0		5,0

Table 6. Uncertainty of qualitative criteria, example

Comparison of alternatives vs. scores is shown in figure 6.

A visual representation provides a richer picture of the evaluation than consideration of numbers.

Step 5: Concluding evaluations, produce final ranking

Total score is calculated as the sum of the products between criteria weights and partial benefit. See figure 7.

As an important part of documentation of final recommended ranking, simulation of probability to be the best alternative is performed. In this simulation, all underlying uncertainties in cash flows and qualitative

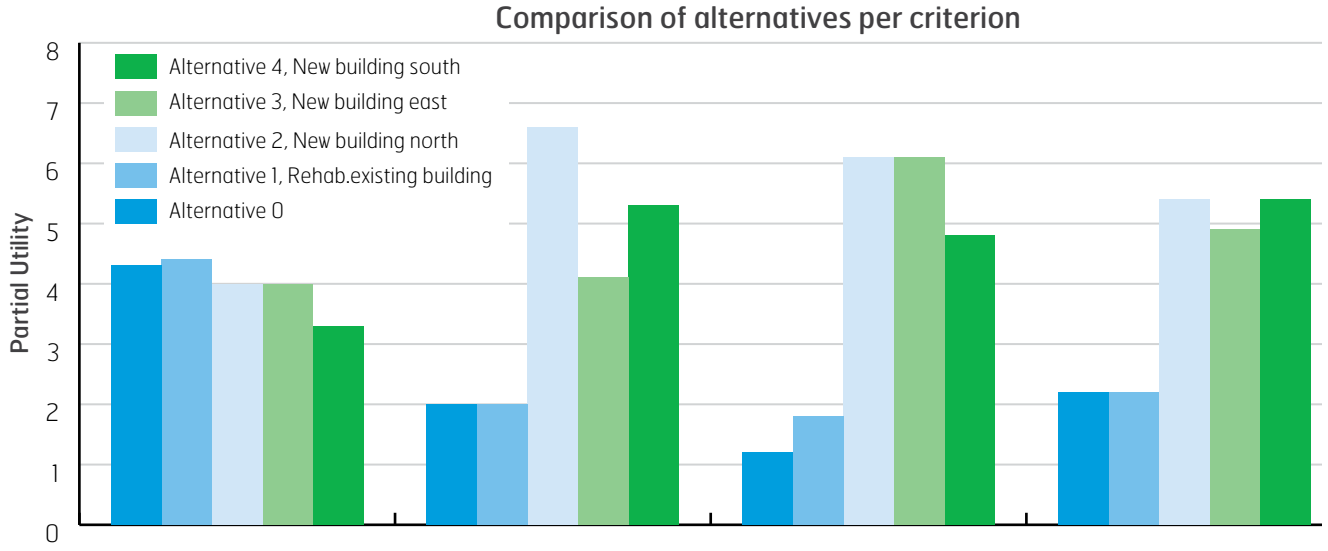

Figure 6. Graphical representation of scores per alternative (mean values), example

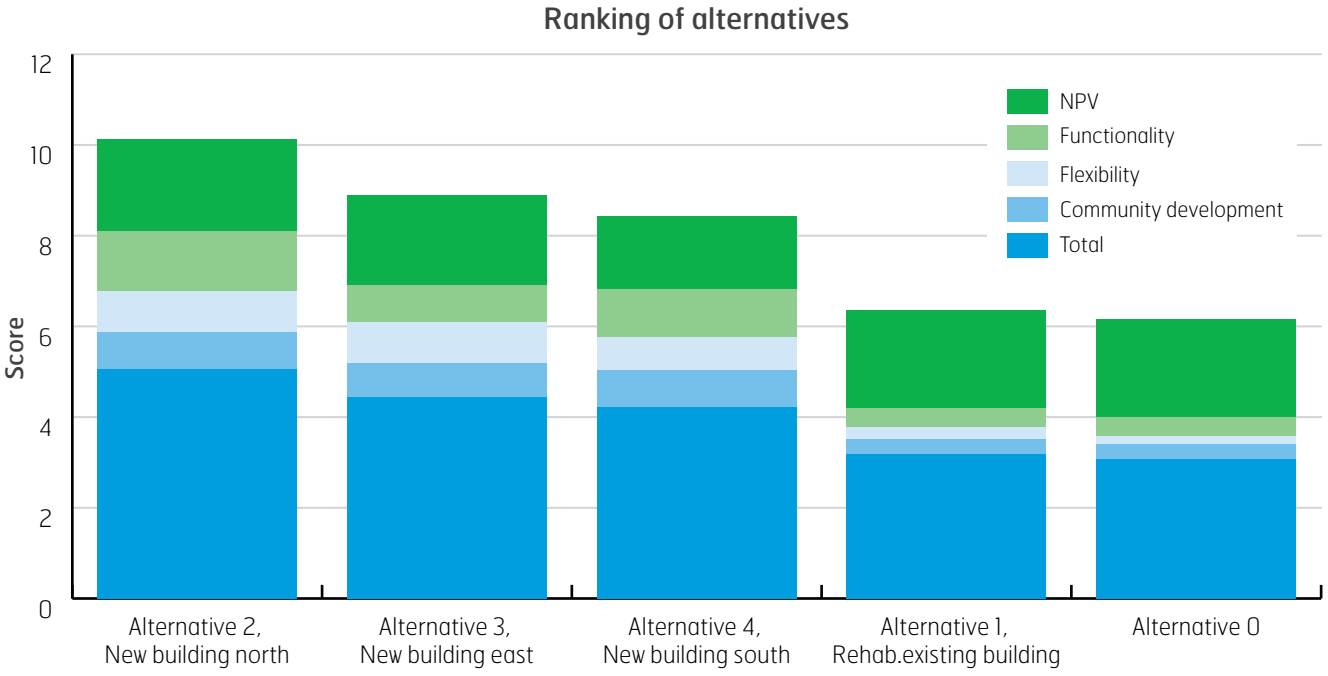

Figure 7. Resulting ranking based on expected values, example

This concept will ensure a common management basis that enhances value creation and unites the objectives of project owner, other stake holders and project management.

evaluations are included. The results from this simulation are presented in figure 8.

When all relevant uncertainties are included, ref. figure 8, the recommendation is much stronger than in figure 7, which shows only expected values.

Sensitivity analysis is performed to investigate the robustness of the recommendation. One will in this process focus mainly on the recommendation with regard to sensitivity with respect to changes in the score for subjective criteria. Example of key questions that needs to be asked: a) How much must the score of each criterion be changed to make the next best alternative the best? And b) Can such a change in score be considered to be within a reasonable assessment? If the answer to last question is yes for one or more of the criteria, make a final evaluation of all potential winners. In this process more detailed information normally will be needed. If the answer is no, the evaluation is final.

The Integrated Value Management Concept in Project Control

The transformation of quantitative and qualitative values to a common measurement scale allows for an *integrated value management concept* used in *operational project control*. The overall objective is to maximize value creation in the project. In this concept, a value parameter is used supplementing traditional control parameters. The use of this parameter, measured in value equivalents is illustrated in the figure 9.

Since measurement of actual value creation is not possible during the project execution phase, *expected value* of value equivalents is estimated. In the assessment of the periodic value of this parameter, a multidisciplinary approach, covering all relevant value aspects is mandatory to produce realistic expected total values. As shown in figure 9, significant changes in value assessment may occur during project execution.

Introducing this value parameter in project control will ensure continuous focus on and enhance the value creation process during project execution.

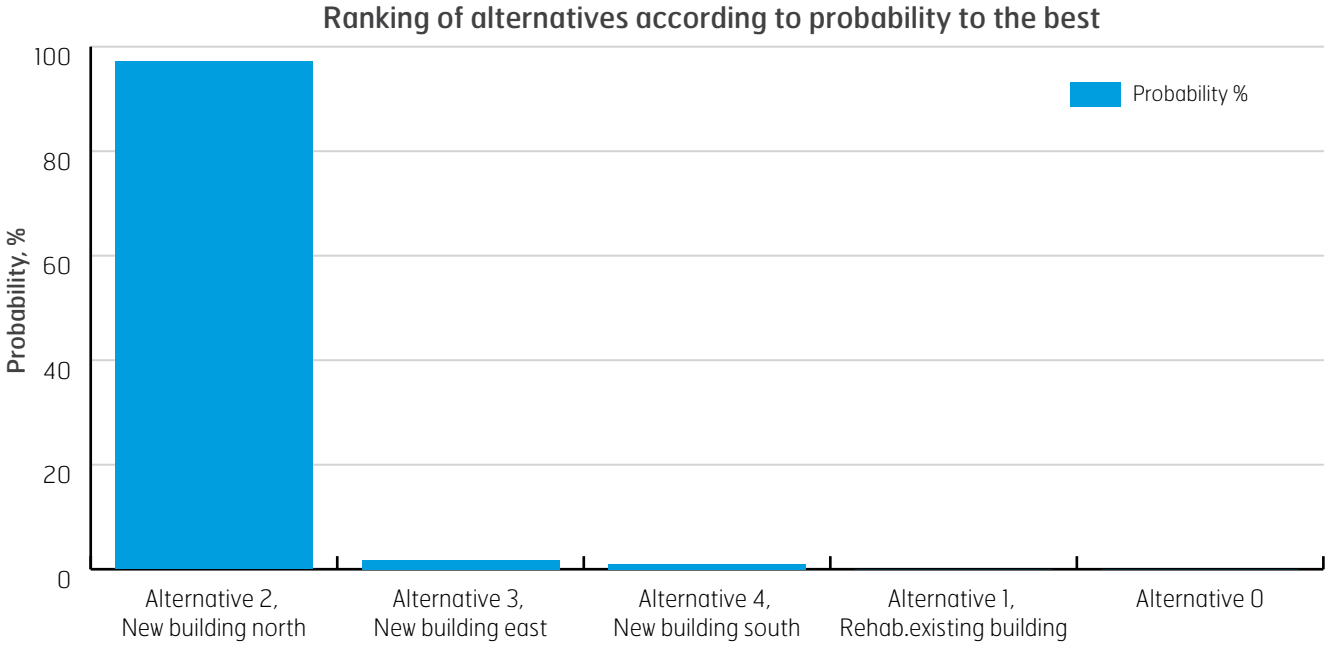

Figure 8. Ranking of alternatives based on probabilities, example

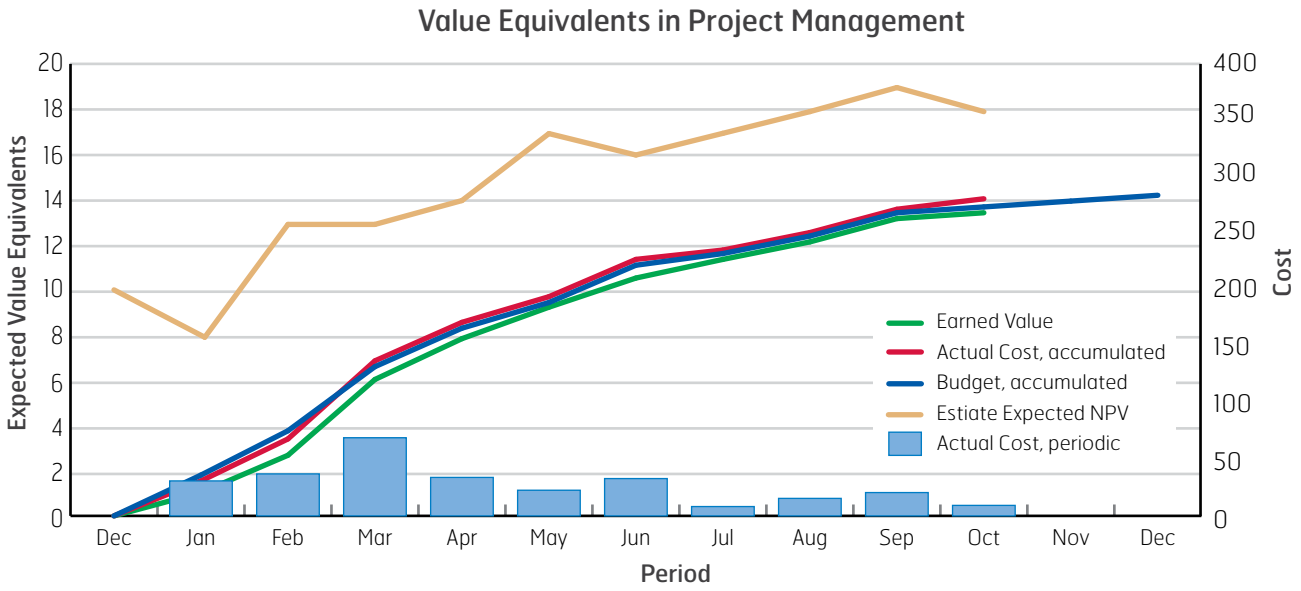

Figure 9. Project Control using Value Equivalents

Summary

In this paper, different value parameters in project management are presented. An integrated value management concept is introduced. In this concept, a control parameter representing the project's overall value creation is included in the project's management regime. This concept will ensure a common management basis that enhances value creation and unites the objectives of project owner, other stake holders and project management.

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A lot at stake:

Using the Negotek Preparation Planner to define project scope

There can be a lot at stake when a project business case and project scope are being defined. If the associated dialogue between the deciding parties is not conducted in the right manner, waste, ineffectiveness and inefficiency might ensue. The question asked in this paper is how can "Negotek Preparation Planner" (NPP)—a classic negotiation approach—be used to help a project manager or business analyst define the scope of a project in a well-orchestrated dialogue with the project owner and other affiliated decision makers? To test this method in a real context, four IT experts and project managers were asked to try it out in a real client or business analyst situation.

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This is an updated and edited version of a paper that was first time published in the proceedings of IPMA 2012 World Congress.

Introduction

Scope definition is a fundamental step in project initiation; defining the desired outcomes and identifying the constraints that must be considered in the project plan. In this paper a modified version of the Negotek Negotiation Preparation Planner (NPP) is applied as a project management tool to meet this purpose. The idea is to see if the NPP could help project managers or business analysts define the project scope in IT projects. The research question is: Can the NPP be a useful tool to define project scope?

Traditionally, negotiations are seen from two main perspectives. One sees negotiations as an attempt to reach a conclusion between two or more dissenting parties, where both try to gain advantage over the other. In this case, preparation for the negotiations is not shared; and when the parties meet, they try to withhold information from each other. The other sees negotiations as a constructive dialogue where both voluntarily share information and try their best to understand their respective positions, needs, interests and demands. In the latter case, rapport building and good cooperation between the parties is everything—this is a voluntary 'give and take' of information and the parties aim to optimize their options to the point where both get the most they can out of the cooperation.

In this paper a method along the latter lines is proposed. The two parties—the project owner (or the customer) and the project manager (or the business analyst)—sit down and try to define the scope of the project with the help of NNP. The aim is to define the wants, needs and interests of both parties before a plan is made and executed. The suggested dialogue should take place in a spirit of full cooperation so that all needs and demands can be explored. In this exercise, a modified NPP is used for identifying the interests, defining the scope and establishing a mutual understanding of what the project should (and should not) entail, and what is needed to make it a success.

Literature review and fundamental definitions

In ICB3.0, project management competence is defined in terms of three dimensions: technical competences, contextual competences and behavioural competences. The ability to negotiate is regarded as one of the competences needed for the professional project manager. (IPMA, 2006 p. 112)

Negotiations are based on the principle of free trade. Even though free trade has probably been practised, one way or another, since antiquity, it was the Scottish philosopher/economist Adam Smith who defined its principles. Smith put forward the theory that all could benefit from the transaction as the market would enable different parties

to make use of their positions and each other's talents. Ever since the Germans and Anglo-Saxons began to theorize about them, negotiations were seen as a rational endeavour; however, in the last decades there has been an increased interest in the influence of emotion on negotiations (Kopelman, Rosette & Thompson, 2006). The tendency had been to regard the 'human factor' as a problem rather than as a strength. This has been changing in the last decades (Fisher, Ury & Patton, 1991 p. 4).

The NPP was originally designed by Professor Gavin Kennedy at the Herriot-Watt Edinburgh Business School to help negotiating parties prepare themselves independently before coming to the negotiating table to debate the contents and issues of the negotiations with other parties. The NPP guides each party in defining interests, tradables and both the extreme demands (entry points) and the least they can accept (exit points). The NPP also asks for these things to be done, in preparation, on behalf of the party/parties one will be facing at the negotiating table. The party preparing his or her position should put him-/herself in the shoes of the other party and attempt to define these same points as they would appear to them. This double-sided preparation can be of great strategic advantage.

Kennedy claims that the preparation for the negotiations is one of the most important steps in the whole negotiation process, and the part that will inevitably define the rest. Often it is the preparation, more than anything else, that determines whether a contract will be formed or not (Kennedy, 1998 p. 47). When the parties then sit down to discuss their agendas, they usually have somewhat opposing views of what they want or would like to get from the other. The NPP guides the parties to consider their interests; and based on that, to define their entry and exit points for each issue (Kennedy, 1998 p. 72-80). Further, the NPP makes the parties define the priorities of the issues: 'high priority' (I have to have it), 'medium priority' (it is of importance but is not a deal-breaker) and 'low priority'.

Many authors present negotiations as a process with stages, such as the preparation stage, the debate stage, the proposal stage, the agreement stage and the contract stage. However, all agree that good preparations are crucial for a successful outcome to the process (Johnson & Luecke, 2005 pp. 112-117) (Kennedy, G, 1998 p. 47) (Raiffa, 2002 pp. 196-197).

The debate stage is also of vital importance. Even if the parties are well-prepared, they might still fail to accomplish their goals just because of how they go about having a dialogue with the other party (When to Fight, www.memphisdailynews.com, 9. February 2012). At this stage, it is important to build rapport with the other, mirror them, and show a positive attitude (Bob Dignen, 2012, Building Rapport). Compromise can also be part of the negotiation and may be necessary when solving a problem between parties. The risk, however, is that neither of the parties get what they want out of the negotiation (Applying Psychology, 2004 p. 195).

Conventional methods to define project scope demand that the following are kept in mind: (1) What is the goal of the project? (2) Who are the stakeholders? (3) What resources are needed? (4) What will the products be? The scope should define all of the desired outcomes (IPMA, 2006 p. 58). The scope defines all the effort that is needed and illustrates what is included and what is not included in the project. This is done by collecting the customer's demands, by defining them in the context of the project, by an agreement on the scope and by managing the scope (PMbok, 2008 p.112). The term 'project scope' can have two meanings: the scope of the project and the scope of the product. When referring to product scope, this accounts for those properties or functions that symbolize the product at handover. The scope of the project, on the other hand, means the work, cost, and time that are needed to deliver the product with the required properties (Kerzner, 2009 p. 57).

Method

An updated version of the NPP was tested in a real business situation within four Icelandic companies. The NPP was adapted in such a way that it could be used to define the scope of the project at hand and four experienced project managers and business analysts were chosen for an in-depth interview. The adapted NPP given to the participants is shown in Table 1.

The four participants came from two different companies in two different business sectors in order to compare their use of the NPP and to get different perspectives. Participant 1 is a project manager with an MPM background, participant 2 works on supply-chain-related projects, participant 3 works on sales-related projects and par-

WHAT ARE YOUR/OUR INTERESTS?			
What are your interests? What matters to you? Why is this important to you?			
WHAT ARE YOUR/OUR GOALS?			
What do you want out of the project? If all parties agreed on the objectives, what would they be? What is most important?			
WHAT ARE YOUR/OUR OBJECTIVES?			
What will you provide for this to happen? What method should be used? What should you do? What should we do? What is most important?			
WHAT IS YOUR/OUR POSITIONS			
WHAT DO WE THINK ABOUT THE THINGS WE NEED TO DISCUSS			
		Our negotiation range	
Issues	**Priority**	**Our most extreme demands**	**Our lowest demands**
1 2 3 4 5 6	M H L H H H	For example max/min time How many? How few?	
Why a contract?		**Why not a contract?**	**Our reaction**
What will be the benefits?		What might cause us not to reach a solution? (between both/all parties)	What can we do about it?

Table 1. Adapted NPP to define project scope

ticipant 4 is a CEO. The companies are key players in the Icelandic IT industry.

To begin with, the participants were introduced to Kennedy's adapted NPP and were provided with basic information on how to use it. The participants then used the method in projects they were currently contracting and designing. In continuation, they took part in a structured interview, one-on-one, and in accordance with the basic principles of qualitative interviewing. The authors tried to gain as detailed information as possible on the experiences of the users. In line with expectations in qualitative exploration, the authors' ideas and understanding grew as they examined the results (Bogdan og Biklen, 2007, p. 33-38).

The authors were able to explore at a deeper level the opinions that were discussed. However, the process was not standardized and there was the risk that the authors could lead the participants with their questions.

Results

The results from the interviews with participants are as follows:

Participant 1 (Thor), project manager with a MPM background

Thor works as a project manager at a bank and holds a master's degree in project management. He used NPP to discuss mutual interests with different stakeholders where the project team was dealing with a major delay. This was causing conflict in the project team and among stakeholders. Thor found that the NPP worked very well to list each party's interests, and the dialogue facilitated an open discussion of fears, hopes and concerns. This enabled both the project manager and the parties to understand each other at a deeper level. Thor did not, however, find it useful to define entry and exit demands in this project, even though he found the basic idea behind such an analysis important. He also suggested alterations to the method when more than two parties are involved. In short, Thor had this to say:

„I found the method to be very effective in decision-making meetings in projects."

Participant 2 (John), supply chain manager

John is a supply chain manager in an IT company. He used the NPP in a project where he had to consult people from the company and a client. The client needed an update of both hardware and software that was essential to his operation. NPP was used twice on the project, both internally within the provider, and with the client. The NPP enabled the parties to explain themselves and openly discuss what they felt was at stake. The NPP pointed to an underlying conflict within the provider that managers had not been aware of, and the method helped to solve the issues before meeting the client. This transparency allowed the provider to address the client in a very open manner, which had a positive impact on the client. John concluded:

"This method is both fun and informative, both for me as a manager and as a person who deals with sales. In the process the project was simplified, fewer people were needed and a well-suited project manager was assigned."

Participant 3 (Erik), sales manager

Erik is a sales manager for an IT company who needed to make a proposal for a project to a client. He used the NPP to define the project scope with the customer. He also used the following standardized process for the meetings where the company negotiates projects:

- Companies introduce their teams.
- The customer assigns a project manager and a project team.
- Needs, interests and project are defined (here the NPP was used)
- Project plan is made and accepted by both parties (here the NPP was used)
- Project implementation.
- Regular meetings to see if the project is on track (final meeting at the end of the project).
- Project is handed over to operations.

Erik concluded:

"I believe this method can work wonders if the staff know how to use it and I give it my best grading."

Participant 4 (Smith), CEO

Smith, who is a CEO for an IT company, used the NPP as a tool to define the scope of an IT project with a client. The participant liked being able to have a specific form to use with customers. The customer felt very engaged and the form helped to set goals and objectives. Both felt the NPP was easy to use and it resulted in commitment and clear focus. Some minor alterations to the method were suggested. Smith concluded:

"The method can help the customer to discuss and define the projects and their scope. In this case, the aim was to get the customer to openly discuss his total vision of the project and it worked. I believe that NPP can be used by employers to 'read' the client and ask the right questions in the order that suits in each case".

Discussion

NPP seems to be an excellent method to define project scope. All the participants agreed that the scope was much better defined when using the NPP. The method also seems to be suitable for dealing with difficult decision making, where open and honest discussion needs to take place in order to reach a conclusion that all can accept. The method strengthens the long-term relationship between the parties and it can be used as a method to sell products and pull out requirements for unidentified solutions.

The use of the NPP also helped the participants to see that it can be good to use a structured method when managing contracts and customer satisfaction. People with a background in project management, as well as those with less experience—such as is often the case with business analysts—can use the method to define project scope.

An improved order of the questions and a more extended training for the user could foster a still better and more beneficial use of the method. In order to fully make use of the NPP, the skill of powerful questioning should also be used: What is most important? What is the purpose? What do we want? What do you want? What are your expectations? What do we need? What is the conclusion we want? What needs to be done?

Conclusion

This project was limited in scope as there were only 4 participants in a qualitative study. This must be kept in mind when interpreting the results. The overall conclusion is however that an adapted version of Professor Kennedy's Negotek Preparation Planner (NPP) can be used to effectively define project scope; in addition, its use builds trust, enhances customer relations, creates consensus and helps to identify the need for new solutions and, therefore, opportunities for selling new projects or products. It also fosters a client-oriented culture with the necessary buy-in of the relevant parties.

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When the Sky Falls on Our Heads

Investigating Project Manager Reactions to Unexpected Events Occurring in Technical Projects in Greece

This paper presents and discusses the reactions of project managers to unexpected events, which occurred in the phases of design, construction and operation of technical projects in Greece. The results show the role and importance of the human factor in the creation of the event and in all phases of the crisis management process.

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Introduction

According to the ISO 21500 Standard (2011), a project is defined as a set of coordinated and controlled activities with start and finish dates, undertaken to achieve an objective, according to specific requirements of time, cost and resources. According to organizational theory though, projects can be perceived as temporary organizations for performing business processes limited in time. Like all other organizations, the project has a specific identity characterized by the project objectives, organization, values and environment relationships. The perception of a project as a temporary organization makes it possible to approach it as a social system (Gareis, 2005).

Viewing projects as social systems includes the elements of risk and conflict related to the projects, giving them a high degree of uncertainty (Dobie, 2007). The innate uncertainty of projects, technical ones especially, makes them prone to unexpected events. In fact, we shouldn't be asking "if" but rather "when" an unexpected event will appear. An unexpected event is considered an event which either has not been predicted or one which has predicted but found statistically impossible to appear, according to previous experience of the organization or the project team. These events act as discontinuities in the project, i.e. phases of instability, where the evolution and progress of the project can be radically altered, and create situations that the project team cannot solve by itself within its function.

Literature provides project manager with various methods to predict potential project risks, to classify them and to devise alternative scenarios to cope with them. However, the transition from theory to praxis is rarely achievable with ease. Recently, emphasis is given in the practices which have actually been used and implemented by professionals (Hällgren and Wilson, 2008). This perspective clearly does not aim to replace existing and well established project procedures, but turns the interest towards project manager actions. In the case of unexpected events, this perspective focuses on what actually professionals do, when they have to face such an event. The words of Drucker are once more appreciated: "What constitutes knowledge in practice is largely defined by the ends, that is, by the practice" (Drucker,1985).

The study of unexpected events and mainly the reactions and responses of project managers to them, whether successfully or unsuccessfully resolved

according to the project managers' perspective, can help us better understand the occurrence mechanisms of such events and give us valuable knowledge for future projects and for the permanent organizational structure of the company. To the words of Vogiatzis: "The desire for a strictly positivist, systemic approach of the art of management is understandable, but actually what happens often is that a less stereotypical approach based on psychology and behavioral factors interprets management better. It respects, if anything, its view as Art..."(Vogiatzis, 2004).

Project type	Total (%)	Successful resolution, %	Unsuccessful resolution, %
Design project	25.5	24.1	27.3
Construction project	54.9	58.6	50.0
Maintenance project	19.6	17.2	22.7

Table 1. Project type relative to the resolution

Background

The existence of risks and crises in projects is well established by experience and practice and documented in the relevant literature. Hällgren and Wilson point out two lessons from Reid's findings: firstly, no one is invisible from the unexpected, given that the human element is involved, and secondly, crises do not discriminate – small and large companies, specialized or not, they will all go through a crisis at some point (Hällgren and Wilson, 2008).

In a research on unexpected events in the defense sector, conducted by Geraldi et al. involving 22 project managers, basic characteristics of successful responses were determined. These were: well established processes embedded in the organizational culture, the project manager's and project team's competences and skills, and commitment and effective communication in the project team (Geraldi et al., 2010).

Of interest is the research conducted by Loosemore (1998a, b, 2000) on crises in construction projects, which led to his "three ironies". At a time when effective communication, mutual sensitivity between project members and collective responsibility are most important, they are less likely. The research showed that during a crisis, people tend to be more selfish, holding crucial information to themselves and using it as a source of power, instead of enabling the its flow. There were "winners" and "losers", according to the amount of extra work that had to be done as a result of the crisis. Collaboration and consensus almost disappeared, because each side tried to obtain the best possible resources that they needed for themselves, resulting in discoursing collective responsibility.

The response's success or not to an unexpected event is included in the project's final assessment. Research conducted by Deutsche Gesellschaft für Projektmanagement (2008) showed that in successful projects, quality is the most important element, whereas cost plays a less important role. In unsuccessful projects on the other hand, no element of the "iron triangle" of project management stands out. Communication, clear objectives' setting and project members' expertise define the success of a project. In a worldwide research by Deutsche Gesellschaft für Projektmanagement and EBS Universität für Wirtschaft und Recht i.Gr. (2010) it is pointed out that the conditions of the project, e.g. time pressure and complexity, do not seem to have a significant impact on the project's success. Risk and uncertainty, however, seem to do. Müller and Turner (2007) showed that project managers link project's success with good performance in the fields of time and cost, whereas elements such as customer and other interested parties' satisfaction play a significantly less important role.

Methodology

The study presented in this paper discusses project manager reactions to unexpected events in technical projects in Greece that actually did occur in the phases of design, construction and operation. The study focuses on the differences between successful and unsuccessful resolutions, trying to shed light to successful practices. Terming the resolution a successful one or not was done by the project managers themselves. The study investigates whether the reaction to unexpected events is linked with the technical characteristics of the project, its structures and its team, and whether possible organisational structures within the project and/or the company existed that acted supportively to a better response to these events. The study also included the mobilization during the crisis and ranking of the project manager's behavioural competences, according to the International Competence Baseline by IPMA; this part of the study is not included in this paper. To the authors' knowledge, such a study is conducted for the first time in Greece.

Project managers with considerable project and program management experience of at least 20 years have been asked to recall two projects, where an unexpected event occurred, one with a successful resolution and one with an unsuccessful one. Subsequently, they filled out a bilingual questionnaire (in Greek and in English) during a personal interview. The questionnaire comprises three parts: the first part contains information about the project (type and size), the second part contains information about the event (type, time-related characteristics and risk characteristics) and the third part contains information about the reaction to it and its resolution. Overall, responses of 33 project managers (28 men and 5 women) were recorded and processed. Of the 51 questionnaires that were filled in, 29 refer to events with successful resolutions and 22 to events with unsuccessful resolutions.

Data analysis and findings

Project

The majority of the recorded projects refer to construction projects. For every project type, the successful and unsuccessful resolutions were about the same. Table 1 shows the categorization of project type in relation to the resolution.

Unexpected event

Unexpected events were found to deal primarily with technical issues and externalities, followed by events related to human behavior. The respondents were free to categorize the event as a combination of the given types, and this fact was taken into consideration during the data analysis. Table 2 shows the unexpected event type per project category. In design projects technical issues prevail, in maintenance projects externalities prevail and in construction projects both issues are of the same importance.

Time-related characteristics of the unexpected event were described through timing (sudden or creeping) and pertinence (untopical or topical). More than half of the events were described as sudden and topical and about 63% has happened again in other projects.

Subsequently, the project managers were asked to give the risk characteristics, i.e. probability and impact, of the unexpected event, as perceived by them. At this point it has to be stressed, that all the recorded unexpected events were deemed as crises; there was no event that was perceived as a project chance. Also, the majority of the organizations haven't compiled a documented risk analysis process; in some of them, alternative scenarios or check-lists have been used. Risk matrices with the aforementioned risk characteristics were compiled; the analysis was done per project type and per event type. An example is given in Figures 1 and 2, where the size of the "bubbles" indicates the number of responses.

Project mangers gave the recorded unexpected events high possibility and high impact. The events were chosen as important crises, but were considered in retrospect as "obvious", thus corroborating the "black swan" effect (Taleb, 2010).

Project managers gave externalities and insufficient project owner support a low probability, because they thought that both events could be easily predicted, although with high impact on the project. Technical issues were given high probability and high impact characteristics. Human behavior and deliverables' issues showed dispersion in probability.

Unexpected event type	Total (%)	Design project	Construction project	Maintenance project
Technical issues	32.1	8	16	2
Externalities	29.6	2	13	9
Fail of sufficient project owner support	7.4	3	1	2
Sponsor withdrawing support	0.0	0	0	0
Resource change and constraints	2.5	0	2	0
Deliverables and scope issues	9.9	3	5	0
Human behavior	14.8	2	6	4
Break of communication with project owner	1.2	0	1	0
Project organization problems	1.2	1	0	0
Other	1.2	1	0	0

Table 2. Unexpected event types

Technical issues

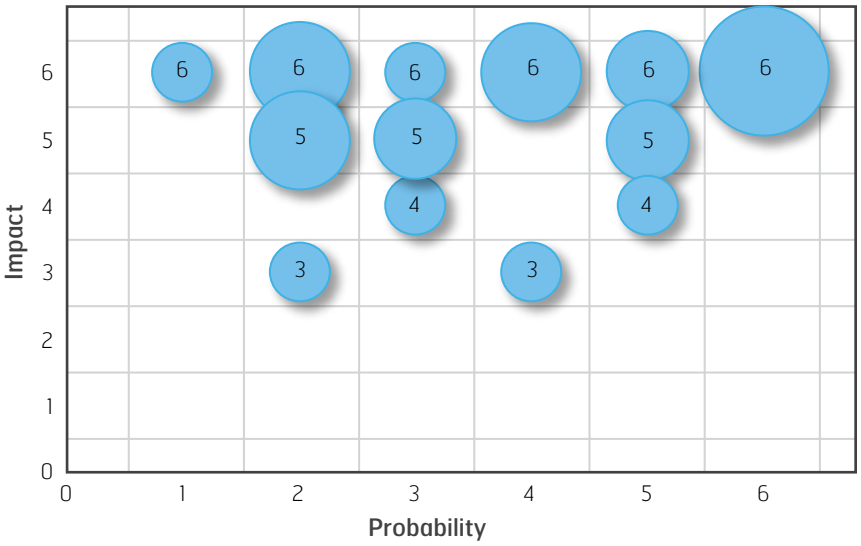

Figure 1. Risk matrix: Technical issues (for all project types)

Construction projects

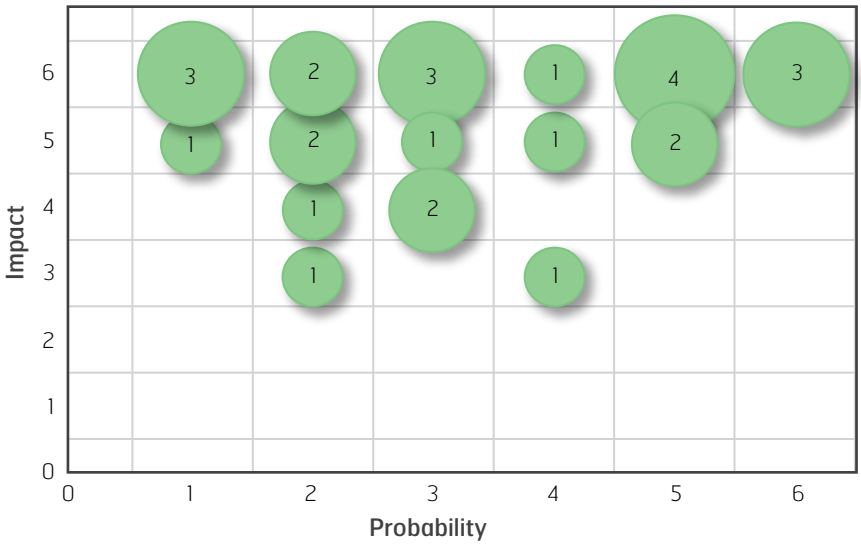

Figure 2. Risk matrix: Construction projects (for all event types)

The "three ironies in construction projects" in Greece

In an attempt to investigate Loosemore's ironies in construction projects in Greece, project managers were asked to rate the presence or lack of effective communication, mutual sensitivity between project members and collective responsibility and teamwork during the event, in a 6-grade scale ranging from 1=total lack to 6=strong presence. Surprisingly, the findings of this research were different than Loosemore's. Figure 3 shows their grouped answers. In 72.4% of the cases collective responsibility and teamwork were very high, as was mutual sensitivity between project members in 82.8% and effective communication in 69.0% of the cases. There also seems to be no difference in the results in relation to the outcome of the crisis. Even if these responses are only the personal opinion and evaluation of only the leading team member, the differentiation from Loosemore's findings is impressive. Cultural background and differences seem to have a profound influence on the way people behave and interact in crises situations. These findings were indirectly confirmed by a subsequent question, were project managers were asked to indicate the factors that played the most important role in the outcome of the unexpected event (Figure 4 and Table 3).

Figure 3. The "three ironies" in construction projects in Greece

Resolution

The respondents were asked to choose the factors that they thought played the most important role in the outcome of the unexpected event. They were free to choose more than one factors or even to define a factor not listed in the questionnaire. Teamwork, effective communication and mutual sensitivity between team members are considered to be the most important factors. This answer verifies the findings of a previous question about the presence or lack of these characteristics during the crisis. In addition to that, in cases where effective communication lacked, project managers commented that in their opinion the outcome of the event might be better, if the presence of communication was stronger. Support from the upper management seems to play an important role as well, as it helps quicker decision making and therefore quicker response to the crisis. It appears to be no significant differentiation to the factors which played the most important role in relation to the outcome of the unexpected event, as shown in Figure 4.

Worth commenting is the low percentage of project management methods and tools, as well as established internal processes. Even in organizations with documented risk management processes that are well embedded in their organizational culture, in case of an unexpected event, project managers choose not to follow them, but instead to rely on the members of the project team. In terms of project management methods, the low percentage is indicative of the low level of maturity in Greek organizations. This part is especially interesting, since research outside Greece has shown that modern project management methods are better embedded in organizational culture and can, when used correctly, help during the response to an unexpected event.

Personal interviews

The personal interviews were conducted in a relaxed atmosphere and the respondents gave freely many details of the unexpected event.

From the responses of the project managers, it was evident that the success of a crisis resolution was directly linked to the effect the unexpected event had on the budget and time schedule of the project. Project managers still consider the "iron triangle" of project management as cornerstone of the project. A limited effect on the project budget and schedule was in half the cases the determining factor in perceiving the outcome of the event as a success. In about a third of the cases, the most important thing for the project managers was to "get the job done", regardless of other consequences. The number of cases, where the outcome was successful due to effective management of interested parties was very limited.

In the cases where the permanent organization structure played an important role

Factors	Answers (%)	Factors	Answers (%)
Teamwork and collaboration	18.2	Permanent organization structures	6.4
Mutual sensitivity between project members	16.9	Use of Standards and Regulations	4.7
Effective communication	16.1	Project management method and tools	4.2
Support from upper management	13.1	Internal processes	3.0
Involvement of Expert	9.3	Other	1.7
Control mechanisms and reports	6.4		

Table 3. Most important factors in the outcome of the unexpected event

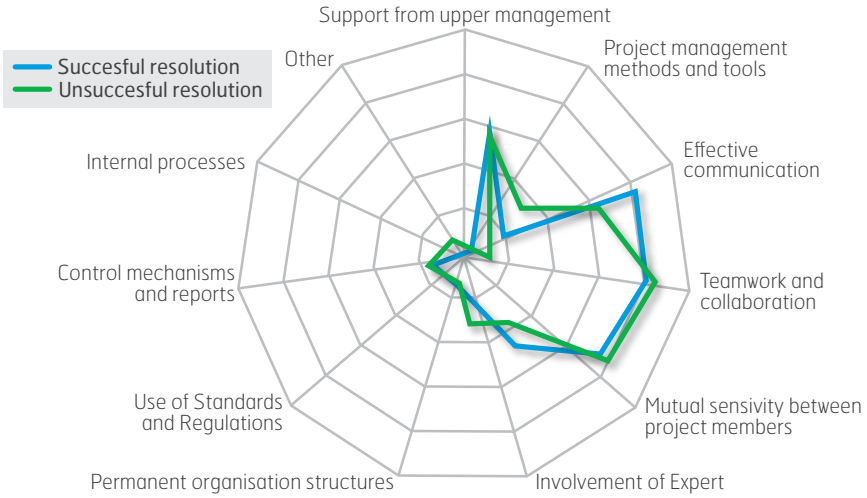

Figure 4. Most important factors in the outcome of the unexpected event for successful and unsuccessful resolution

in the outcome of the unexpected event, it seems that decentralization and organizational independence of business sections lead to more flexible structures that are able to deal faster with an unexpected event. Of great importance remains still the seamless communication between units, so that feedback and flow of information remain constant. In cases where the project manager had the authority to contact and communicate directly with other interested parties, even of higher hierarchical levels, the response time, along with bureaucracy, was decreased.

The respondents pointed out the importance of the upper management understanding the critical nature of the situation that the unexpected event had created. In cases where the upper management failed to quickly understand the demanding situation, the response time was greatly increased and this eventually led to even more problems. Of course, the quality of communication between the project manager and upper management plays an important role. The lack of support by the organizational structure and culture leads to increased need for leadership skills by the project manager.

Regarding the leadership style that project managers followed, there seems to be no particular type. There were descriptions of all types and styles, even extreme ones. For example, a project manager said: "A system of Dictatorship/Democracy was applied! Somebody had to take full responsibility for the actions taken." The majority of the respondents acknowledged that they relied on the technical expertise, the experience and abilities and the creativity of the project team members to resolve the crisis.

The most significant spontaneous comment most respondents made was that the interview of this research had a "psychotherapeutic" effect on them, as they were given the chance to discuss and review the difficult situations they had had to face. This comment is the most spectacular evidence of the importance of the recovery and learning phase of crisis management. Taking into consideration that the overwhelming majority of Greek construction companies not only does not have risk and crisis management processes, but diffusion of knowledge is problematic as well, recapitulation of the facts during the interview was viewed as an opportunity to verbalize bad feelings that the crisis created in them, but also to sum up lessons learned by it.

Conclusions

The research and especially the interviews made quite clear that a successful response to unexpected events has to be based on three pillars: people, processes and organizational structure.

Figure 5. The three pillars of successful response to unexpected events

The project team members are the basis for the response during a crisis. Greek project managers rely heavily on their project team for a successful resolution. It has to be noted that even large Greek construction companies are equivalent to middle-sized European ones, so management is based largely on personal contact and human relations rather than rigid organizational structures, enabling the social systems approach. Experience and expertise play an important role in the handling of difficult situations. Therefore, team members need to further develop their skills and competences through training and coaching. Team members need to also work on improving cooperation inside the team to enhance collective responsibility and mutual sensitivity. Special care need to be taken for recovering after a crisis, ideally right after the unexpected event and at project close-down. Team members should be able to express the negative emotions created by the crisis and to sum up lessons learned.

Processes and standards help organizing, recording and maintaining a seamless flow of information. Needless to say, the development of well documented risk and crisis management processes is of great importance. Even more important though, is the cultivation of risk management culture inside organizations. Greek construction companies are in great need of that. In that context, it must always be stressed out that discontinuities in a project need not only be catastrophic crises but also chances as well. Even more so, a project's success needs to be finally detached from the classic pitfall of the "iron triangle" of project management and the importance of other less conventional criteria must be acknowledged. Engineering schools have to take the lead in cultivating a culture of excellence in project management and risk management.

Finally, a decentralized organizational structure creates more a flexible environment for crisis response. A step towards that direction is the creation of regional/decentralized directions with empowered upper management representatives. However, Greek construction companies need to take a step further and aim at creating a project-oriented organization.

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The M.A.G. Factor

Where and How Much MAG Does Each Project Deserve and Need?

This paper explains in outline a new and original assessment and scoring system to assist project managers in assessing the areas and levels of Management, Administration and Guidance (MAG) that clients may require when being involved in projects.

The development of this system arose from consideration of client : project manager relationships on a variety of projects; and in particular the amounts of assistance and help that may need to be provided.

A number of possible criteria, circumstances and influences were identified; and these have continued to be refined through project activities and by undertaking exercises with students on post graduate courses. Research and applications are continuing. Contributions, comments and corrections are welcome.

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UK

Introduction

This paper seeks to introduce the MAG factor – a new original assessment and scoring system for a whole range of projects. A MAG factor assessment will greatly assist addressing the following conundrums:

1. Why is it that some Clients appear to need more help then others with the management, administration and guidance (MAG) for their projects?
2. Why is it that projects which seem to be similar, even identical, in fact require different MAG contributions and workloads?
3. When there is only a limited MAG expertise and resource available where should they be applied most effectively?
4. When there are particular MAG concerns what should be done about them?
5. What type, style and ethos of project management are needed and available?

What is MAG? Management, Administration and Guidance

When a client / customer identifies a project or is landed with a situation to which a project approach is most appropriate then they will at some point consider how the project is to be organised. From a client's perspective the project management requirements may be broken down into three groups of: Management, Administration and Guidance – hence MAG.

Management is the management of the project, programme or collection of projects. This will involve determining the project, devising the course to deliver it, selecting the team and driving all aspects of the project forward to achieve its goals. Leadership is involved and the strategic aspects are established and prioritised. Some Clients (or their internal managers) may want and feel able and willing to undertake this role throughout the project. Others may feel that are in need of MAG help overall, or for some aspects and/or some stages. The question is: "How much Management help in the MAG Factor does the Client require?"

Administration covers the more technical and tactical aspects of projects. Inevitably there is some administration involved in all projects – sometimes a lot – covering secretarial, accountancy, budgeting, payments, arranging events and meetings, keeping records, monitoring, analysing and reporting, etc. Much of this activity and data supports the people and organisations who are managing as above. Some clients have experienced in-house resources who are available and willing to undertake all or most or only some of these tasks. The project activities and administration needs usually grow as the project progresses. The question is: "How much Administration help in the MAG Factor does the client require for this project?"

Guidance even when a client has confidence in their own Management and Administration there may be circumstances when they need Guidance

in the definition or delivery aspects of a project. Whilst most clients have reasonable knowledge of the legal system, accountancy, human relations, property, etc. they still retain or go to specialist advisors for guidance. This may extend even to representations by such people but will not necessarily replace the overall management, decision making and ownership which will remain with the client or their designated project or operational representatives. Such guidance if required may be provided by mentors, advisors, gurus, friends, managers – as above, administrators – as above. So the question is "How much Guidance help in the MAG Factor does the Client need?"

Timing and Plans of Work

Most projects can be broken down into discrete stages. For example for construction/building projects there are usually three key stages:

- Feasibility: when the brief and scheme solution are established, key approvals and funding sought and go ahead received.
- Pre-Construction: when the main detail design, procurement and orders are completed.
- Construction: when the main works are executed with any remaining design and procurement through to completion – and probably a bit beyond to deal with settlement of accounts and any outstanding issues.

  And then there is:
- Post Completion: this stage is vital in securing the original outcomes, benefits and more for the client that justified the resources and efforts in the first place.

Therefore it is possible to undertake a MAG Factor review at the start of each of these stages, as well as any single time on a project when such matters are being addressed.

In addition there are two other circumstances that a MAG Factor review might take place:

- At times of difficulty/problems/crisis – this is when a review might address if the appropriate levels of client contribution and MAG help are being applied and to appropriate aspects of the project.
- At the end of a project as part of the project debrief or lessons learned to ascertain where the pressures and problems occurred and how they were handled.

Outputs

From experience, research and application ten key criteria have been identified to establish the MAG factor plus some further other optional criteria.

It is possible to apply these criteria to any project to establish:

- the overall and average MAG Factor scores – in comparison with other projects and benchmarks,
- the aspects on which low scores have been established and how they are to be maintained,
- the aspects on which high scores have been established - and the consequential efforts and attention that are required on these aspects to deal with them or to endeavour to lower their scores
- a common understanding within the client body on the likely MAG needs and solutions.
- a common approach on how naturally limited MAG efforts are to be expended and prioritised.

MAG Scoring

The recommended approach to scoring is to use a 1 to 10 approach; with 1 being low and 10 being high; "not applicable" , if really true, can score 0/zero/nil.

The scores can be allocated in relation to the resource efforts to be applied to each criteria in a reasonable time period of say a week, month or period for a stage within a plan of work.

In cases where the team can not agreed on a single score then they can record the range under consideration, move on and return on conclusion of the exercise.

Similarly if some circumstances for a criteria would score high while others would score low then record circumstances, assumptions and scores for both – and place their resolution in the recommendations.

MAG Criteria

Ten criteria have been identified as consistent influences which affect the amount and foci of MAG required on projects. The ten selected criteria with a brief description of each are as follows:

i. Same or Different Sector

Clients who operate within the same sector as the project will probably need less help. For example a bank might need less help bringing in revised banking regulations but might need more help in setting up Health and Safety arrangements.

ii. First Time Type / Volume

Clients who are undertaking this type or size of project for the first time will probably need more help.

For example a retailer who has previously acquired and fitted out their shops on an individual basis would need more help for say a national acquisition and make-over of fifty units.

SCORE SHEET
Project Title .....
Date .....

Description .....
.....

Assumptions .....
.....

Ref	Criteria	Score	Explanation	Further Notes
1	Same or Different Sector			
2	First Time Type			
3	First Time Contract/Procurement			
4	In Occupation			
5	Individual or committee culture			
6	Funding			
7	Own Occupation			
8	In Relationships			
9	Stakeholders			
10	Availability			
11				
12				
13				
	Total MAG Factor Score			
	Average MAG Factor Score			

Recommendations .....
.....

iii. First Time Contract / Procurement

New, different or complex contract and procurement will probably need more help. For example in understanding and applying the first design and build arrangement or multi packaged contracts or foreign sourced services or products. Similarly assembling suitable component tender lists – with sourcing, assessing and selecting in a new market place or against new requirements will require more effort.

iv. In Occupation / Use

Clients with premises in occupation or ongoing operations will need more help with their capital projects. Also for example places adjacent to day-to-day use – road widening; airport facilities; railway track, signalling and stations – these all requires more help, than a green field situation.

v. Individual or Committee Culture (double edged)

Single headed clients probably need less help then say large complex committees – possibly. Except sometimes the individual client can be quite demanding and/or distant; while the experienced committee can be effective, authoritative and prompt – possibly.

vi. Funding

Externally funded projects probably need more help to secure monies, satisfy funders, deal with payments, etc. compared with internally, simple or self funding. For example projects with Lottery backing and/or the need for public fundraising will need help with financial expertise and fund raising resourcing.

vii. Own Occupations / Use

Projects for self occupation probably need more help. Owner occupiers have been known to demonstrate characteristics of being fussy, multi headed, have difficulties making decisions, and wish to change their minds to achieve perfection – while at the same time they may work on projects for others without these features.

viii. In Relationships (double edged)

Clients in established satisfactory partnering, technical staff employed or other relationships will need less new help – possibly.

However it may be that not all the team members are in such relationships with the client and/or the relationships have become casual and not consistent with the formal agreements or reasonable expectations – possibly.

ix. Stakeholders

Projects with diverse or multiple stakeholders will probably need more help.

Management, coordination and liaison of stakeholders and participants can be underestimated as soft skills, compared with the other more tangible hard tasks.

x. Availability (double edged)

Clients with predominant day jobs and distractions will need more help with their additional projects – or will they?

However some clients with busy schedules can be quite decisive and hands off, whilst clients with time on their hands can become over involved(?)

xi. Other Criteria

There may be other circumstances in which clients require more help with the management, administration and guidance (MAG) of their projects which can be individually recognised.

- For example "Health Safety and Welfare" requirements are a high priority and require extra attention in power generation and transmission projects as well as other sectors. Additional help may be required when these are particular issues.
- "Diverse Locations" such as in manufacture at various plants of the components which constitute modern aircraft – compounded by language, culture, time zone differences.
- "Unknowns, Uncertainties and Complexity" cover situations where there are likely to be a greater number of changes than usual on a project; or there are more unknowns at a stage then might reasonably be expected (these circumstances should also be reflected in higher than usual budget contingencies to deal with them as well as aspects of Agile Management and Complex Project Management).

Way Forward

The recommended way forward for the first time is on the following lines:

1. Read over and become familiar with the criteria.
2. Select all or some of the case study projects as trials – in Section 10.
3. Select a team including the client for a workshop set of exercises which hopefully will include experienced and less experienced people working in mixed sets of two or three or individually.
4. Undertake the case studies and complete their MAG Factor scores and prepare the recommendations – discuss the outcomes – use a sample score sheet. [Inevitably there are ranges of interpretations for each case study and how to apply each criteria and as a group. There are no right answers. Some sample model answers are available to aid discussions of the outcomes.]
5. Now the real thing! Provide a brief summary of your project to hand, add some assumptions, including for whole project duration or a stage only, assess the project against the criteria and any other criteria that may be pertinent – calculate the scores and make recommendations for the organisation of the project.
6. Discuss the project, the assumptions, the scores and recommendations to decide what is to be done to clarify any

issues, make decisions, implement decisions and set date or circumstances to monitor the MAG criteria and undertake further review(s).

7. It is advisable to identify, consider and record any further assumptions the team may wish to adopt from the outline project description and the application of criteria.

Case Studies

The following case studies, all with construction sector content, are offered to test readers' approach to the MAG Factor. Readers can add their own case studies as previous or hypothetical projects with other features or from other sectors.

A. Road Signs in Blobshire

To replace all road signs in Blobshire UK with miles and kilometre measurements to new European standards within eighteen months

B. More Housing

Phase 3B of a housing estate for a further 120 semi-detached and detached two and three bedroom units on previously agricultural land by "Top Ten House Builders Co. Ltd"

C. Rejuvenated Theatre

Demolition of 50% of community theatre premises, rebuild, refurbish, extend as part of urban regeneration with European, regional, local and public funding contributions – to correspond with 100 year anniversary – while continuing theatre productions elsewhere.

D. Mixed Development at Transport Interchange

First new, privately-developed mainline railway station in a city centre on contaminated railway land, 800m from existing station, with specially assembled consortium covering commercial offices, property, construction with design, retail operator, railway company and local authority – with some social residential, some leisure, some public space and link to adjacent separate bus/coach station and tram terminus.

E. Improved Security to Retail Units

Following a series of break ins and robberies on security and insurance advice it has been decided to improve security to 1000 shop units throughout the country and 20 in North America with replacement locks throughout, internal CCTV systems to half and internal or external shutters to about quarter - to be undertaken in evenings and Sundays over a concentrated four week period as soon as possible.

Conclusions

In all project situations there is a need for competent, good practice, helpful Management, Administration and Guidance. The reverse is not appropriate or helpful e.g. inexperienced or remote or very light management; or bureaucratic or burdensome or inadequate administration; or inappropriate or mistimed or self-serving guidance.

The MAG Factor is a fairly simple concept to understand. It provides a considered and measured way to deal with a range of issues which otherwise can be vague and difficult – and on which possibly only intuition and good/bad experience would otherwise be used.

However despite the simplicity developing skills in applying and using the MAG Factor approach takes some time and effort – hence the inclusion of case studies and suggestions of a joint workshop approach to bring out understanding and assist applications.

Skills in use will be improved by being organised in the approach, carefully considering criteria (and changing or adding other criteria), by keeping previous score profiles, and observing the influences of refining project descriptions or assumptions.

This approach can also be of assistance to or be combined with risk reviews, benefits management, governance contributions etc.

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Tom Taylor

Tom Taylor is committed to project management and to projects in their many forms.

He has enjoyment through APM as an eminent professional body as an Honorary Fellow, a Registered Project Professional, a past chairman, Sir Monty Finneston recipient and of the President's Medal as well as being an active member of London Branch, being involved with Sustainability in Project Management and visiting many places and meeting nice people.

He has been fortunate to work on many super projects mainly in UK and with a construction element.

He has written books, booklets and articles on project management, business and recessions plus sustainability. Tom is involved in contributing to conferences, courses, lectures and talks – and trying to make them interesting. A full profile and notes of current activities may be found at www.tomtaylor.info

Sometimes he thinks he should do more. Sometimes he thinks he should go for a swim. Sometimes he does the ironing.

Sustainability in Project Management: Reality Bites

The relationship between project management and sustainable development is rapidly gaining interest from both practitioners and academics. This article reports an analysis of 56 case studies on the integration of the concepts of sustainability in the way organizations initiate, develop and manage projects. The study uses the maturity model for sustainability integration that was presented at the 2010 IPMA World Congress for the assessment of the level of sustainability consideration.

The study found an overall average level of sustainability consideration in the actual situation of 25.9%. For the desired situation, this score is almost 10 percent higher, showing an ambition to take sustainability more into consideration. The study also showed that the way sustainability currently is considered, shows the traditional 'less bad' approach to sustainability integration. However, the scores of the desired situation shows clearly the ambition of the organizations to consider sustainability more proactively.

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This is an updated and edited version of a paper that was first time published in the proceedings of IPMA 2012 World Congress.

Introduction

The relationship between project management and sustainable development is rapidly gaining interest from both practitioners and academics. Silvius & Tharp (2013) report almost 95 publications and studies on the topic. The nature of these studies is mostly interpretive, giving meaning to how the concepts of sustainability *could* be interpreted in the context of projects (for example Barnard et al, 2011; Gareis et al., 2013). Some publications add a normative angle, prescribing how sustainability *should* be integrated into projects (for example Labuschagne and Brent, 2006; Silvius et al., 2012). These studies approach the integration of the concepts of sustainability into project management from a conceptual, logical or moral point of view. Given the fact that the relationship between sustainability and project management is still an emerging field of study (Gareis et al. 2009), these approaches make sense. However, they do not diminish the need for more empirical studies to understand how the concepts of sustainable development are implemented in practice. This article aims to do just that. It reports an analysis of 56 case studies on the integration of sustainability in projects.

The study builds upon the maturity model for sustainability integration that was presented at the 2010 IPMA World Congress in Istanbul (Silvius & Schipper, 2010). Based on the concepts of sustainability, the maturity model assesses the level of consideration of sustainability in projects and project management, in terms of resources, business processes, business model and products/services. It thereby answers the question: *To what extent, do organizations consider the concepts of sustainability in the initiation, development and management of projects?*

The maturity model

Maturity models are a practical way to 'translate' complex concepts into organizational capabilities and to raise awareness for potential development. Most maturity models are derived from the Software Engineering Institute's Capability Maturity Model (Carnegie Mellon Software Engineering Institute, 2002) and thereby based on the maturity of processes. For example, project management maturity is in this context a measure for the organization's ability to perform project management and related processes in a controlled and optimized way. For the goals our sustainability maturity model, however, Silvius and Schipper (2010) developed a maturity model that addresses the consideration of sustainability aspects more content specific.

The model is based on two dimensions. The first dimension is that of the aspects, or criteria, of sustainability, the second that of the level or depth of considering sustainability.

Economic Sustainability	Return on Investment	- Direct financial benefits / Net Present Value - Strategic value
	Business Agility	- Flexibility / Optionality in the project - Increased business flexibility
Environmental Sustainability	Transport	- Local procurement / supplier selection - Digital communication - Travelling - Transport
	Energy	- Energy used - Emission / CO2 from energy used
	Water	- Water usage - Recycling
	Waste	- Recycling - Disposal
	Materials and resources	- Reusability - Incorporated energy - Supplier selection
Social Sustainability	Labour Practices and Decent Work	- Employment - Labour / Management relations - Health and Safety - Training and Education - Organizational learning
	Human Rights	- Non-discrimination - Diversity and Equal opportunity - Freedom of association - Child labour - Forced and compulsory labour
	Society and Customers	- Community support - Public policy / Compliance - Customer health and safety - Products and services labelling - Market communication and Advertising - Customer privacy
	Ethical behaviour	- Investment and Procurement practices - Bribery and corruption - Anti-competition behaviour

Table 1. A checklist for integrating sustainability in projects and project management (Knoepfel, 2010).

Criteria of sustainability

Sustainability in the context of sustainable development is defined by the World Commission on Environment and Development (1987) as "forms of progress that meet the needs of the present without compromising the ability of future generations to meet their needs". The definition emphasizes the aspect of future orientation as a basic element of sustainability. This care for the future implies a wise use of natural resources and other aspects regarding the environmental footprint. However, sustainability requires not just a 'green' perspective, but also a social one. Elkington (1997), recognizes this in his 'triple bottom line' or 'Triple-P (People, Planet, Profit)' concept (Figure 1): Sustainability is about the balance or harmony between economic sustainability, social sustainability and environmental sustainability (Elkington, 1997).

Elaborating on the three perspectives of the Triple-P concept, several organizations developed frameworks of indicators of sustainability. A widely used framework in (external) sustainability reporting is the Sustainability Reporting Guidelines (SRG) by the Global Reporting Initiative. Companies can use the SRG to indicate to shareholders and consumers their economic, social and environmental performance. The SRG framework consists of an extensive set of indicators, from which companies can select a set that is relevant to their operations or industry.

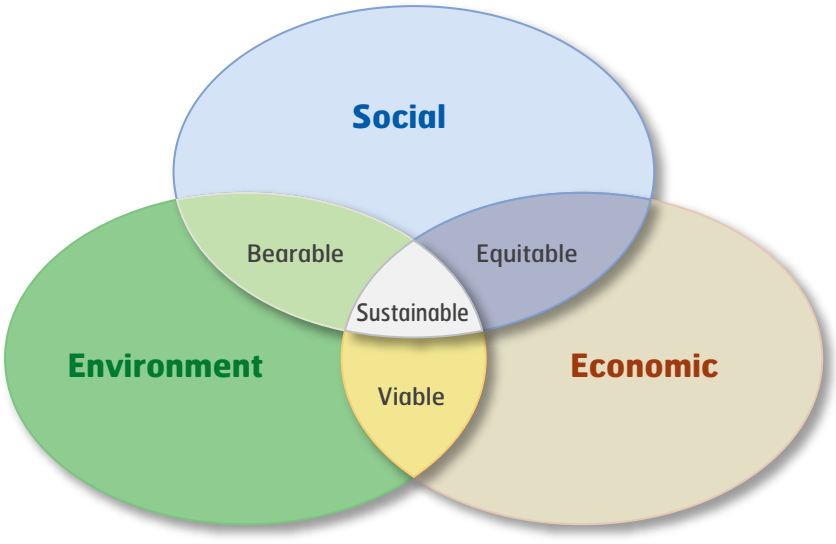

Figure 1. The Triple-P concept of sustainability

At the 2010 IPMA Expert Seminar 'Survival and Sustainability as Challenges for Projects', the participants used the SRG to develop a 'Sustainability Checklist' (Table 1) for projects and project managers (Knoepfel, 2010). The maturity model used in our study adopted this checklist as operationalization of the criteria of sustainability.

Level of consideration

The second dimension of the maturity model is that of level of consideration of sustainability. This dimension is based on the observation that sustainability can be considered on different levels (Silvius & Schipper, 2010). A first logical level is the level of resources. For example using resources that provide the same functionality, but are less harmful for the environ-

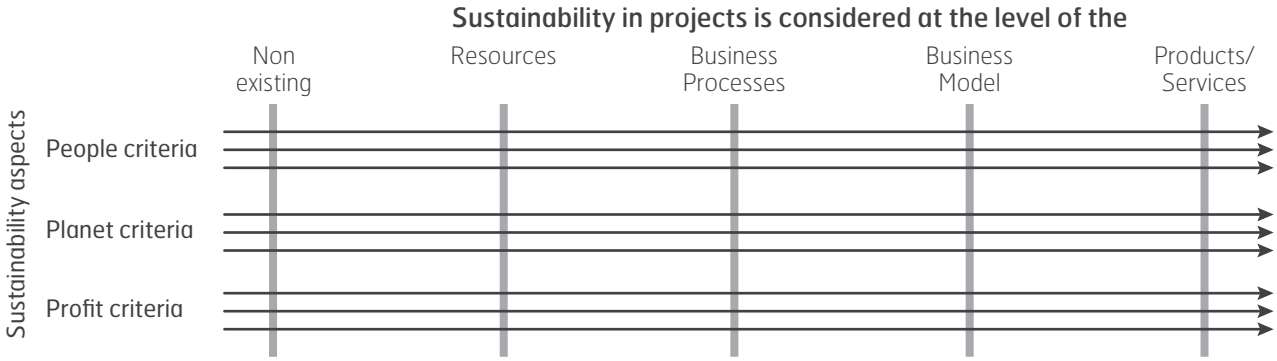

Figure 2. Conceptual model of the assessment (Silvius & Schipper, 2010).

ment, like using hybrid cars instead of normal fuelled cars. These actions can reduce the less sustainable effects of operating the organization, but do not take away the cause of non-sustainability. A second level of consideration is therefore the business process in which the resources are used. A more sustainable business process takes away the cause of non-sustainable effects instead of just limiting or compensating them. For example optimizing a service management process in such a way that less travel is required.

A third level of consideration is looking at the way the products or services are delivered: the business model. For example changing from a strictly off-line business model to a combined on-line and off-line business model, may have favourable effects on sustainability because of the fact that on-line shoppers travel less than off-line shoppers. A fourth and final level of consideration takes into account not only the business process or model to deliver products and services, but also the products and services themselves. How can products and services be innovated to contribute to a more sustainable society. For example a product that learns children to respect nature.

The different levels of consideration reflect the more modern views on sustainability in which the challenge is not to make 'bad' products, services and processes 'less bad', but to make them good.

Maturity assessment

The maturity model assesses the level (business resources, business process, business model, products/services) on which the different aspects of sustainability are considered in the project. Figure 2 shows the conceptual model of the assessment.

For each sustainability aspect an assessment of the current situation and the desired situation is asked. This provides guidance for improvement and development. The assessment is reported in a graphical way, showing both the actual levels and the desired levels of integration of the sustainability aspects. Based on the report, organizations can discuss their ambition levels (the desired situation) on the different perspectives, develop an action plan to bridge the gap between actual levels of maturity and desired levels and to monitor their progress.

The study

Given the interpretive and normative nature of the available insights on the topic, we selected an exploratory approach to the empirical study, based on a quantitative analysis of the maturity assessments.

Data was collected through a study that included maturity assessments of 56 projects in 46 organizations. The maturity assessments were performed in structured interviews with project managers, project sponsors and other key stakeholders. An important condition was that the respondent was in a position to give an informed answer to the questions of the assessment.

The study covered a broad range of industries and company sizes. 78% of the projects were characterized as building and/or construction projects, and 22%

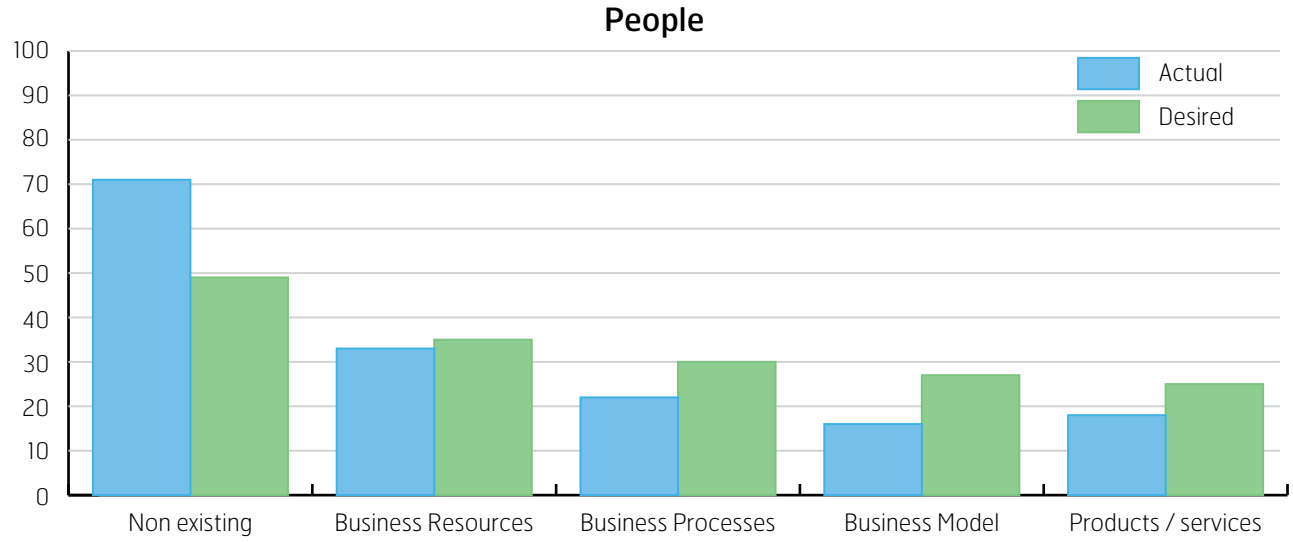

Figure 3. The results of the study for the People perspective

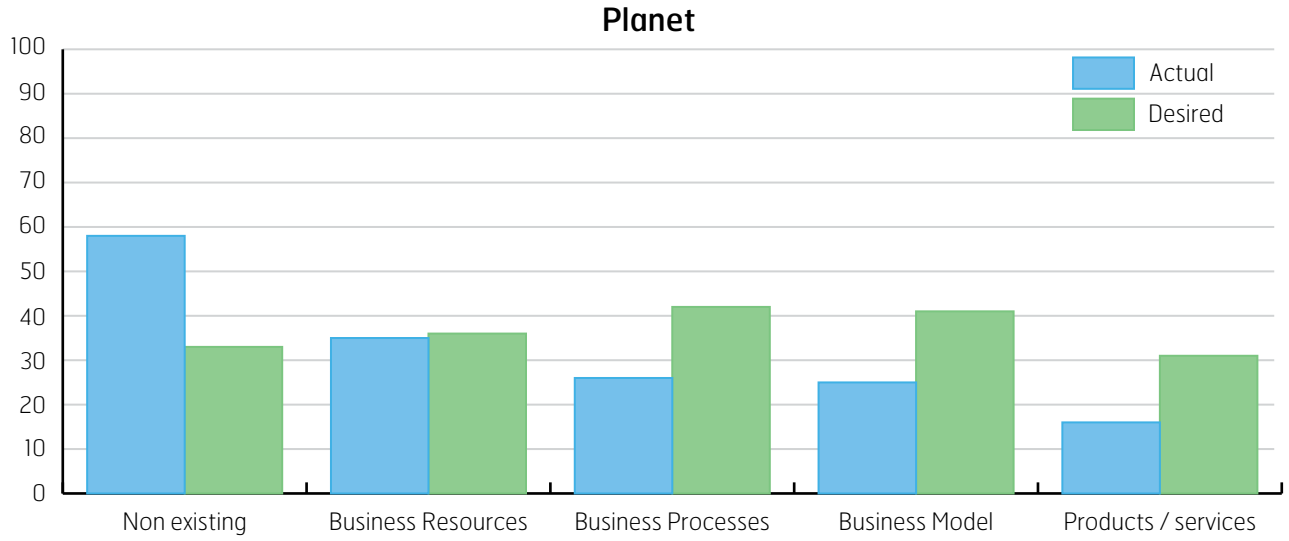

Figure 4. The results of the study for the Planet perspective

of the projects as organizational change or information technology projects. The majority of the projects in the sample had a budget of either < 1 Million € or between 10 and 100 Million €.

The maturity of the participating organizations were located in Europe (40). The non-European organizations were located in Asia (5) and the United States (1). Approximately 73% of the projects were international projects.

Findings

People perspective

Figure 3 provides the findings of the study summarized for the People perspective. In the graph, a 100% score on a certain level of consideration indicates that all organizations in the study scored this level of consideration on all eight questions of the people perspective. A 100% score therefore suggests that the people perspective is fully considered on this level of consideration, by all participating organizations. A 50% score indicates that the people perspectives is only half taken into account on this level of consideration. The graph shows both the actual as the desired situation.

The results show that the desired scores, on all levels of consideration, are higher than the actual scores, except for the 'non existing' category. This indicates that there is clearly an ambition in the participating organizations to consider sustainability more substantially in their projects. Both desired and actual scores are strongest on the Business Resources level.

Planet perspective

Figure 4 shows the results for the Planet perspective.

Also the results on the Planet perspectives show higher scores for the desired situation than for the actual situation, indicating an ambition to consider sustainability more than today. The pattern of the actual scores over the four levels of consideration shows resemblance with the scores on the People profile. The desired scores, however, shows highest scores on the business process and business model level.

Profit perspective

And finally, Figure 5 shows the results for the Profit perspective.

Not surprisingly, the Profit perspective shows the relatively highest scores on the consideration levels. Also on this perspective, the desired scores are higher than the actual scores, with exception of the business resources level, and of course the non existing level.

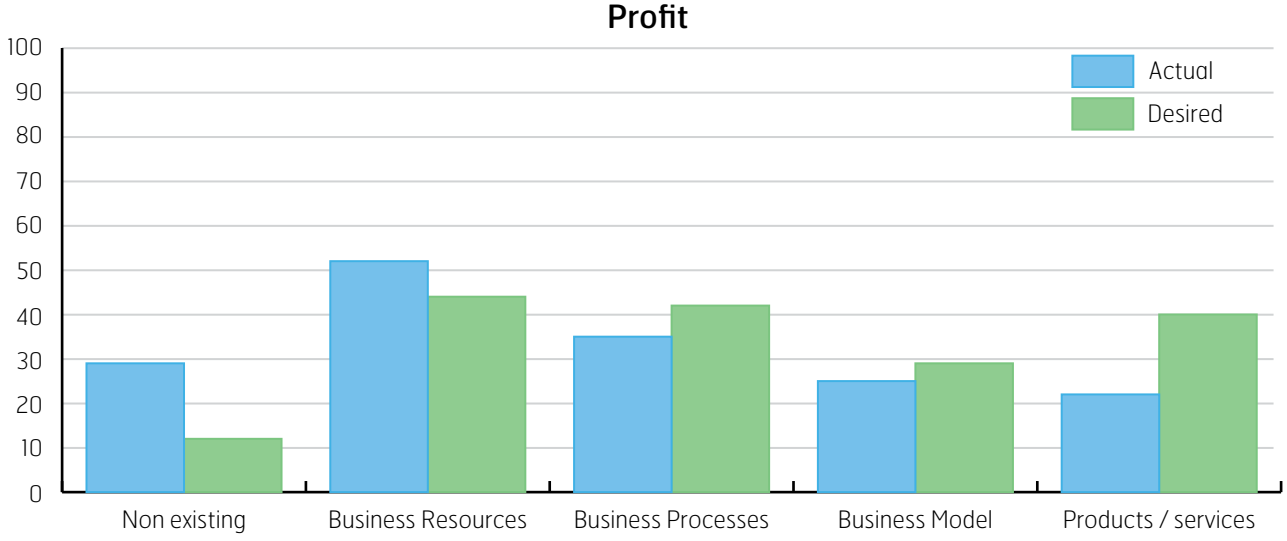

Figure 5. The results of the study for the Profit perspective

Sustainability is an emerging trend, now moving from reputational strategy towards business orientation.

Discussion

Based on the findings on the three perspectives, a few observations can be made.

Overall level of consideration

When considering the answer categories that reflect any consideration of sustainability, an overall average level of sustainability consideration of 25.9% was found. For the desired situation, this score is almost 10 percent higher: 34.9%. And although these scores do not seem to be quite high, the difference between actual and desired level is clear. In fact, a visual inspection of Figures 3, 4 and 5 shows that the scores of the desired situation are consistently higher than the actual situation, on the four levels of consideration for all three perspectives, with the exception of the business resources level of the Profit perspective. The largest 'gap' between desired and actual situation appears in the planet perspective (13%). This result may indicate that in the Western world, sustainability, is very much associated with the environmental 'green' concerns.

Overall, the desired situation scores 9 percent points higher than the actual situation (35% versus 26%). This indicates a clear ambition of the participating organizations to consider sustainability more in their projects.

The influence of the strategy of the organization with regards to sustainability is noticeable in this result. The organizations that do not mention the consideration of sustainability in their strategy, scored an overall level of sustainability consideration (actual situation) that is considerably (more than 10%) lower than the organizations that include some mention of sustainability consideration in their strategy. However, for the desired situation, both groups score approximately equal scores (32.2% and 31.6%), indicating that the ambition of the organizations on the consideration of sustainability in projects, seems to be independent of the mentioning of sustainability in the strategy.

Differences between the levels of consideration

The results of the different perspectives more or less all show the same pattern over the different levels of consideration, in the sense that the consideration of sustainability aspects appears to be highest on the resources level and lowest on the products/services level. This pattern corresponds with the traditional 'less bad' view of considering sustainability. However, from the scores of the desired level of consideration, the ambition to consider sustainability on a more proactive level shows.

When comparing actual and desired levels of consideration the gaps on the business processes, business model and products/services levels, are substantial, whereas the gap on the business resources level is negligible. This outcome indicates that the participating organizations understood that the current 'resources' orientation in considering sustainability should be complemented by a more modern 'corporate responsibility' orientation, in which organizations ask themselves how their business model, products and services can contribute to sustainable development.

Differences between the three perspectives

Visually it appears from Figures 3, 4 and 5 that the profit perspective, scores the highest level of consideration, followed by the planet perspective and the people perspective. This dominant position of the profit perspective is not unexpected. Also the lowest scores for the people perspective is not entirely unexpected, given the fact the majority of the firms in the sample was European. In Europe, the labour conditions and social aspects are relatively well taken care of, and 'sustainability' is often identified with 'green'. In other regions and cultures, the people perspective may score higher.

Conclusions

This article reported an analysis of 56 case studies on the integration of the concepts of sustainability in the way organizations initiate, develop and manage projects.

The study found an overall average level of sustainability consideration in the actual situation of 25.9%. For the desired situation, this score is almost 10 percent higher, showing an ambition to take sustainability more into consideration. Given this ambition, it should be expected that the consideration of sustainability in projects will develop further in the future.

The results of the study indicated that sustainability is most of all considered on the level of the business resources, corresponding with a traditional 'less bad' approach to sustainability. However, the scores of the desired situation shows clearly the ambition of the organizations to consider sustainability more proactively on the level of the product or service. The results also indicate that the people perspective is least considered.

From the previous conclusion we can also conclude that in the near future the attention for sustainability in projects will grow. Sustainability is an emerging trend, now moving from reputational strategy towards business orientation. The personal values of individual project managers and sponsor and the formal attention from company strategy will drive this ambition.

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Gilbert Silvius (1963) is an independent researcher and lecturer in the field of project management. He acts as program director of the Master of Project Management program at HU University of Applied Sciences Utrecht in the Netherlands. This innovative program, that looks at project management from an organizational change perspective, has a special focus on the integration of the concepts of sustainability in Projects and Project Management. Also in research, Gilbert focuses on sustainability in Projects and Project Management. He is the lead author of 'Sustainability in Project Management', published by Gower publishing (2012), and 'Sustainability Integration for Effective Project Management, published by IGI Global (2013). Next to an established academic, Gilbert is an experienced project manager with over 20 years of experience in various business and IT projects. As a principal consultant at Van Aetsveld, project and change management, he advises numerous organizations on the development of their project managers and their project management capabilities.

Ron P.J. Schipper

Ron Schipper (1971) is project manager and principal consultant at Van Aetsveld, a leading consulting firm in project and change management in the Netherlands. He has more than 15 years of experience as a project manager in realizing (organizational) change in various organizations. As well as executing projects, he is interested in developing the profession of project management and transferring this knowledge to other people in the Netherlands and developing countries. As sustainability emerges as a theme for the world, his attention has focused on the implications for projects and project management. Ron is also an external examiner in the Master of Informatics programme at HU University of Applied Sciences Utrecht in the Netherlands.

Snezana Nedeski

Snezana Nedeski has a MSc in International Business from Maastricht University. During this time she also taught the class 'Sustainability in Project Management' at the School of Applied Sciences in Utrecht. Her interest in this topic led to additional research in this area, and several co-authored conference and journal papers. Her goal is to implement this theory in the future, starting with a tech start-up in Amsterdam where she will be part of the management team and will aim to create a platform for sustainability principles. While implementing the theory in practice in this setting, she hopes to continue theoretical research on an academic level as well.

Business Analysis by Projects

Business analysis helps organizations define the optimal solution for their needs, given the set of constraints (including time, budget, regulations, and others) under which that organization operates.

Most of the work assigned to business analysis professionals is within the boundaries of a project, as it is a temporary endeavor initiated to achieve very specific goals.

Most projects are initiated because there is a problem that needs to be solved. It is important during project scoping to make sure that you really understand the problem that is to be addressed. The purpose of business analysis is to understand the true business problem before trying to solve it.

When the implementation process is too complex or the organizational change involves too many dimensions, a better choice is to have a chain of projects or even a program.

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This is an updated and edited version of a paper that was first time published in the proceedings of IPMA 2012 World Congress.

Introduction

Most projects are initiated because there is a problem that needs to be solved. It is important during project scoping to make sure that you really understand the problem that is to be addressed. The purpose of business analysis is to understand the true business problem before trying to solve it.

Business analysis is emerging as a professional field, and so standard definitions and role delineation are emerging as well. The International Institute of Business Analysis (IIBA®) definition of business analysis according to Guide to the Business Analysis Body of Knowledge® (BABOK® 2.0) is:

"Business analysis is the set of tasks and techniques used to work as a liaison among stakeholders in order to understand the structure, policies, and operations of an organization, and to recommend solutions that enable the organization to achieve its goals."

The Business Solution Life Cycle (see Figure 1) depicts the typical phases involved in developing a new business system:

Study period phases:

- Strategic Planning – development of organizational vision, mission, values, and strategies
- Enterprise Analysis – identification of the business need, problem, or opportunity, definition of the nature of a solution that meets that need, and justification of the investment necessary to deliver that solution

Implementation period phases:

- Requirements Analysis – requirements elicitation, documentation, analysis and validation
- Solution Design – management of changes to requirements and insurance of traceability of requirements through design artefacts (graphic models, structured models, tabular data)
- Construction – development of solution and management of changes to requirements
- Testing – testing the solution
- Delivery – acceptance of solution by ensuring that the business requirements are fulfilled by new business solution

Operations period phases:

- Operation and Maintenance – support for daily operation and management of changes to the deployed solution
- Deactivate – deciding when the solution should be removed or replaced.

Business Analysis and Projects

Most of the work assigned to business analysis professionals is within the boundaries of a project, as projects and programs play an important role in value creation in contemporary society and companies. An estimate suggests than about 30% of global economic activities are initiated through projects (Turner, Huemann et al. 2010).

Nowadays projects are large, complex, and usually with high risks. Following are the characteristics of typical projects that are underway in almost all organizations:

- Business process reengineering by optimizing current processes and making them more efficient
- Organizational change by improving the organizational structure, capabilities, and competencies
- New lines of business by implementation of new business processes, organizational structures, and technologies to support the new operations
- New software development, in-house or outsourced, followed by software maintenance or enhancement

For instance, information technology can now realize extremely complex assignments, but despite the IT industry's major growth, an alarming statistic depicts: almost 70 percent of really big IT projects fail.(Hopkins, Jenkins 2008)

"Getting what you want out of information technology is difficult— very difficult. By the time it's delivered, it disappoints. It's always too little, too late, for too much. When we finally get new technology, we don't use it." (Cramm 2010)

Reason	%
Incomplete requirements	**13.1%**
Lack of user involvement	**12.4%**
Lack of resources	10.6%
Unrealistic expectations	**9.9%**
Lack of executive support	9.3%
Changing requirements/ specification	**8.7%**
Lack of planning	8.1%
Didn't need it any longer	**7.5%**

Table 1. Reasons for project failure (Hull, Jackson et al. 2004)
Sources: Standish Group,1995 and 1996; Scientific American, September 1994

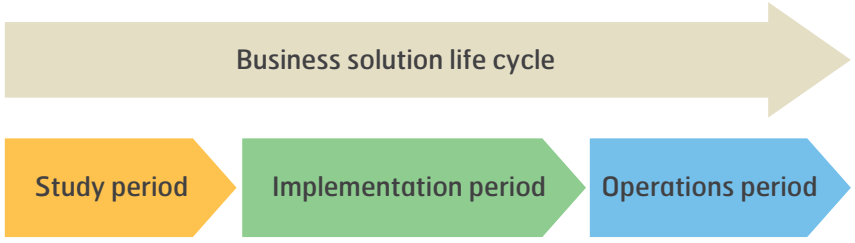

Figure 1. Business solution life cycle (Hass 2008)

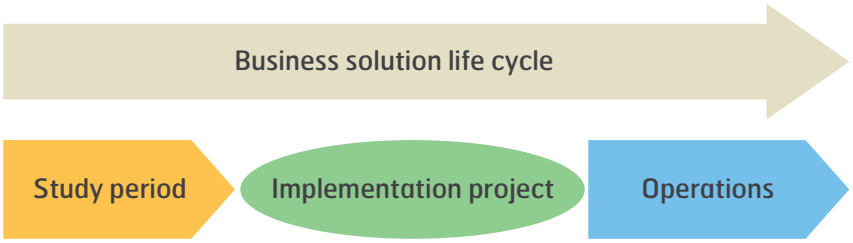

Figure 2. Implementation phase as project

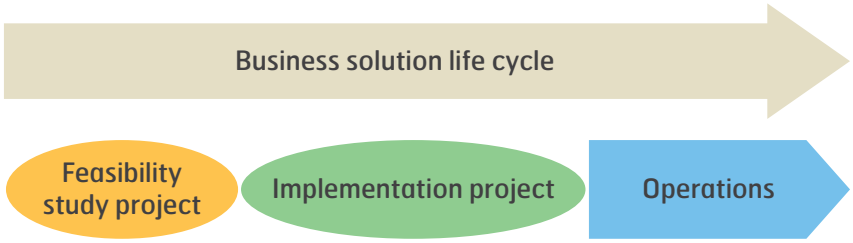

Figure 3. Enterprise analysis phase as project

Statistics reveal that more than three in five IT projects do not do what they were supposed to do for the expected costs and within the expected timeline. Some figures show the following (Simon 2010):

- 49 percent suffer budget overruns
- 47 percent result in higher-than-expected maintenance costs
- 41 percent fail to deliver the expected business value and Return On Investment (ROI)

The main reasons why all kind of projects fail are presented in Table 1. The results are taken from surveys conducted by the Standish Group in 1995 and 1996, and represent the percentage of projects that stated various reasons for project failure. The most common reasons for project failures relate to requirements (see in bold).

By focusing more on business analysis activities in project initiation process and during project implementation, the issues related to requirements quality and relation to stakeholders expectations and involvement can be definitely improved.

Business Analysis by Projects

The most critical contribution of business analysis in the business solution life cycle is during:

- study period in enterprise analysis phase, when the real business need is defined and the optimal solution is identified,
- implementation period in requirements analysis phase, when the detailed requirements are defined.

Enterprise analysis outputs provide context to requirements analysis and to solution identification for a given initiative or for long-term planning. Enterprise analysis is often the starting point for initiating a new project and is continued as changes occur and more information becomes available. (Figure 2)

The definition of the business need is frequently the most critical step in project initiation. The business need defines the problem that the project will find a solution for. The way the business need is defined determines which alternative solutions will be considered, which stakeholders will be consulted, and which solution approaches will be evaluated. Although enterprise analysis is usually performed as a working group, the large scope and the uniqueness of the process (e.g. feasibility study) may require performance by a project (see Figure 3).

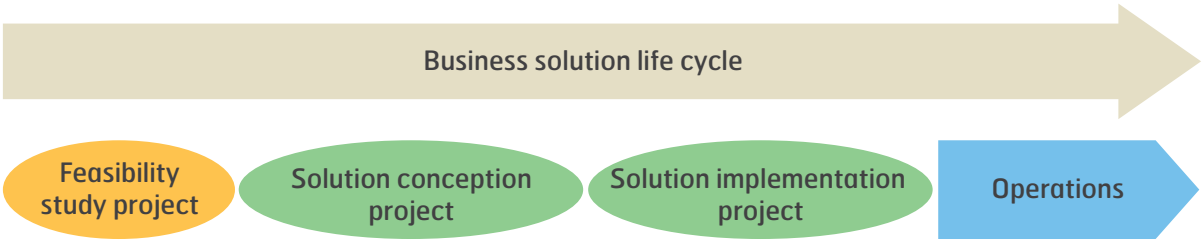

Figure 4. Implementation phase as chain of projects

In the enterprise analysis process business analysts assess the current capabilities of the enterprise and identify the gaps that prevent it from meeting business needs and achieving desired outcomes. They determine if it is possible for the organization to meet the business need using its existing structure, people, processes, and technology.

If the organization can meet the business need with existing capabilities, the resulting change is likely to be relatively small, organized as a working group or a single project. However, if existing capabilities are inadequate, it will probably be necessary to launch a chain of projects or even a program to create that capability (Figure 4).

The purpose of defining the solution scope is to describe the recommended solution in enough detail to help stakeholders to understand which new business capabilities need to be delivered. A change may be needed to any component of the organization, including (but not limited to): business processes, functions, lines of business, organization structures, staff competencies, knowledge and skills, training, facilities, desktop tools, organization locations, data and information, application systems and/or technology infrastructure.

The advantage of having a chain of projects instead of a single project is the flexibility offered by several go/no go decisions between projects (Figure 5) and a better planning of the solution implementation phase.

Conclusion

The business need is analyzed and the business requirements are defined in the enterprise analysis phase during the study period, which can be organized as an individual project, if needed.

The solution scope is defined based on business requirements during the solution conception project, where detailed solution requirements (functional and non-functional) are elicited, analyzed, documented, and approved. These results form the basis for the planning of the solution implementation project or program. The planning of the solution implementation projects is also part of the solution conception project.

Solution scope may change throughout the solution implementation project, based on changes in the business environment or as the project scope is changed to meet budget, time, quality, or other constraints.

A concrete example of the implementation of the chain of projects concept for business analysis activities is presented in the following case study.

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Victoria Cupet

Victoria Cupet is a consultant, trainer and coach with an experience of more than 9 years in the field of business analysis and project managements. Victoria has multiple international certifications, including CBAP certification from IIBA® and PMP from PMI®. Victoria has a key role in promoting business analysis in Romania, in her position of president of the local chapter of IIBA®. Also, Victoria is a member of the writers team for the new version of the BABOK® Guide v3.0.

Case Study: RGC Cloud

As ROLAND GAREIS CONSULTING (RGC) provides consulting services the use of latest and common RGC knowledge among all consultants, as well as the office personnel, is one of the key success factors.

Until 2012 no formal knowledge management, meaning no processes and no support by an IT tool, was available within the organization. Therefore information gathering was very difficult and time consuming.

In 2011 business analysis and project management were applied to implement knowledge management in an efficient and qualitative way.

Business Need of the RGC

RGC provides consulting services wherefore the use of latest and common management approaches among all consultants, as well as the office personnel, is one of the key success factors. Also common access to some business data is crucial. Because formal knowledge management was not well enough implemented in the organization, meaning either by processes or by the support of an IT tool, gathering information was time consuming and difficult. This demand resulted in the idea to put the RGC data into the cloud.

The main objects of consideration in the business need definition were:

- The email service
- The customer relationship management
- And the knowledge management

Management of RGC Cloud by a Chain of Projects

To ensure the best solution for the organization and high qualitative results RGC Cloud was managed as a chain of projects with Go / No Go decisions in between (see Figure 5).

The Feasibility Study

The enterprise analysis as first BA process was performed within a feasibility study project. It had the following objectives:

- Problem analysis of Knowledge Management, Email and CRM developed (see Figure 6 and Figure 7)
- SWOT analysis for Knowledge Management, Email and CRM conducted (see Figure 8)
- Objectives of the investment defined
- Solution approaches and scopes for Knowledge Management, Email and CRM defined
- Rough cost-benefit-analysis for Knowledge Management, Email and CRM developed
- PM Plan for the project RGC Cloud conception under consideration of sustainable principles developed
- Vision document developed
- Go/no go decision for project RGC Cloud conception taken and initial scope of solution selected

The Conception Project

With the assignment of the conception project the following objectives were agreed on:

- AS-IS situation incl. AS-IS processes analysed (see Figure 10)
- TO-BE situation incl. TO-BE processes analysed (see Figure 11)
- Stakeholder requirements defined
- Solution requirements and transition requirements defined
- Technical design specification developed
- Detailed cost-benefit-analysis performed
- PM Plan for the project RGC Cloud implementation under consideration of sustainable principles developed
- Go / No Go decision for project RGC Cloud implementation taken and solution selected

The Implementation project

The following objectives were agreed on:

- Knowledge Management solution implemented, tested and operational
- Email solution implemented, tested and operational
- CRM solution implemented, tested and operational

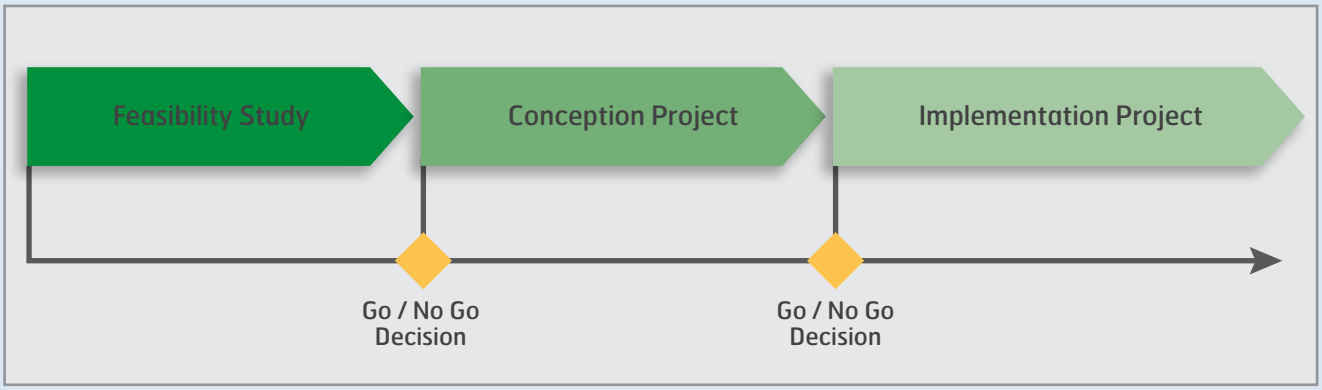

Figure 5. Chain of projects with Go / No Go decisions in between

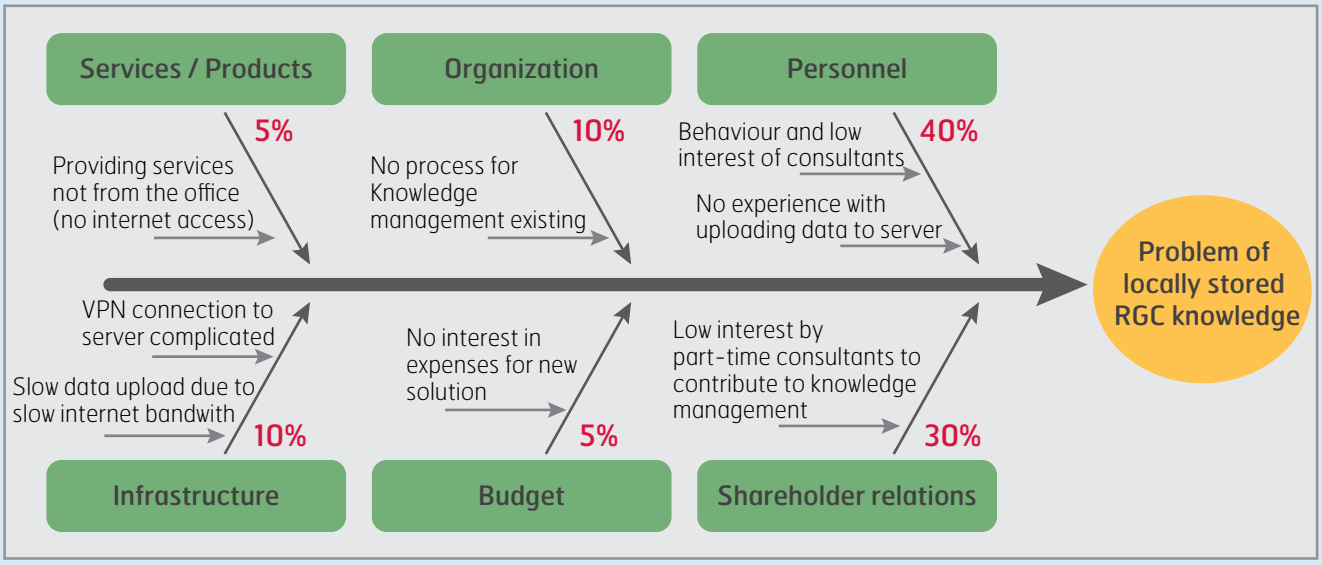

Figure 6. Root-cause analysis

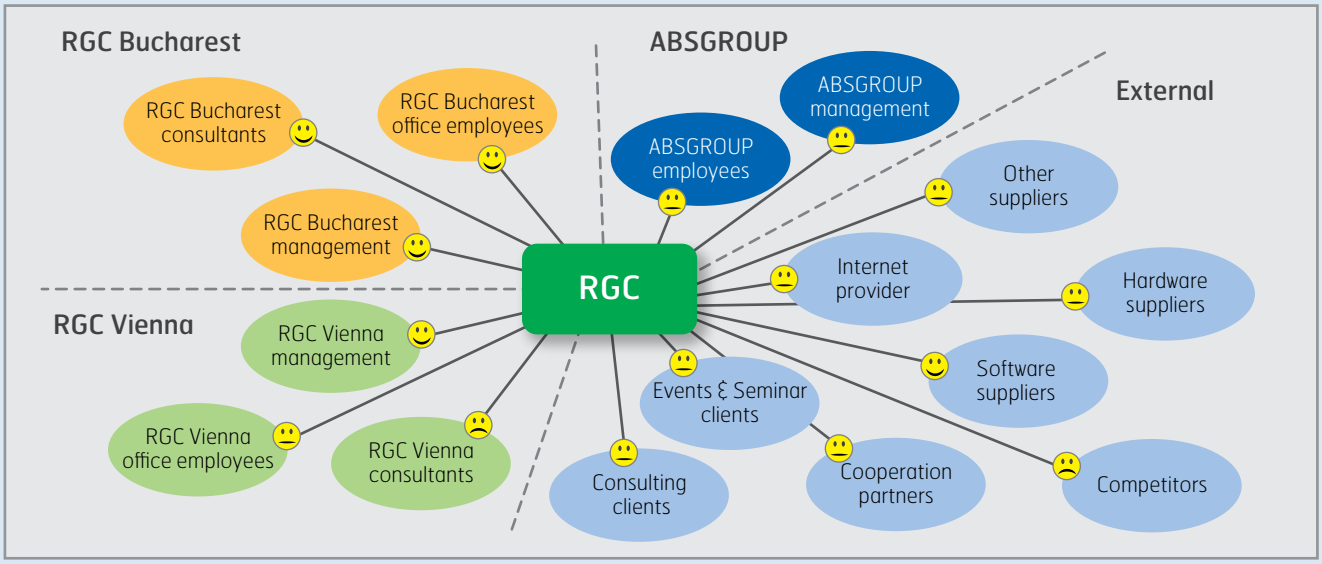

Figure 7. Stakeholder analysis

Strength	Weaknesses
- No change in current services or products required - Perception of RGC management as being an innovative company that is able to "Go" for new technologies - Qualified employees for solving the problem/opportunity - Young employees and consultants that are open minded and learn fast - eMail: RGC Vienna: already familiar with exchange services - CRM: Good quality of CRM data	- Knowledge Management: Need to change consultants behavior and attitude towards their contribution to knowledge management - eMail: RGC Bucharest: not familiar with exchange services - CRM: not available in RGC Bucharest and only partly used in RGC Vienna - Backup of RGC data should be improved; risk for data loss - RGC consultants work across different countries, no easy access possible
Opportunities	**Threats**
- Use of "state od art" technology - To be perceived as being as innovative company by clients and competitors - Better RGC services through availability of RGC knowledge to all employees	- Current technology will be outdated - CRM: Old version not anymore supported by Microsoft Windows 7 / newer devices

Figure 8. SWOT Analysis

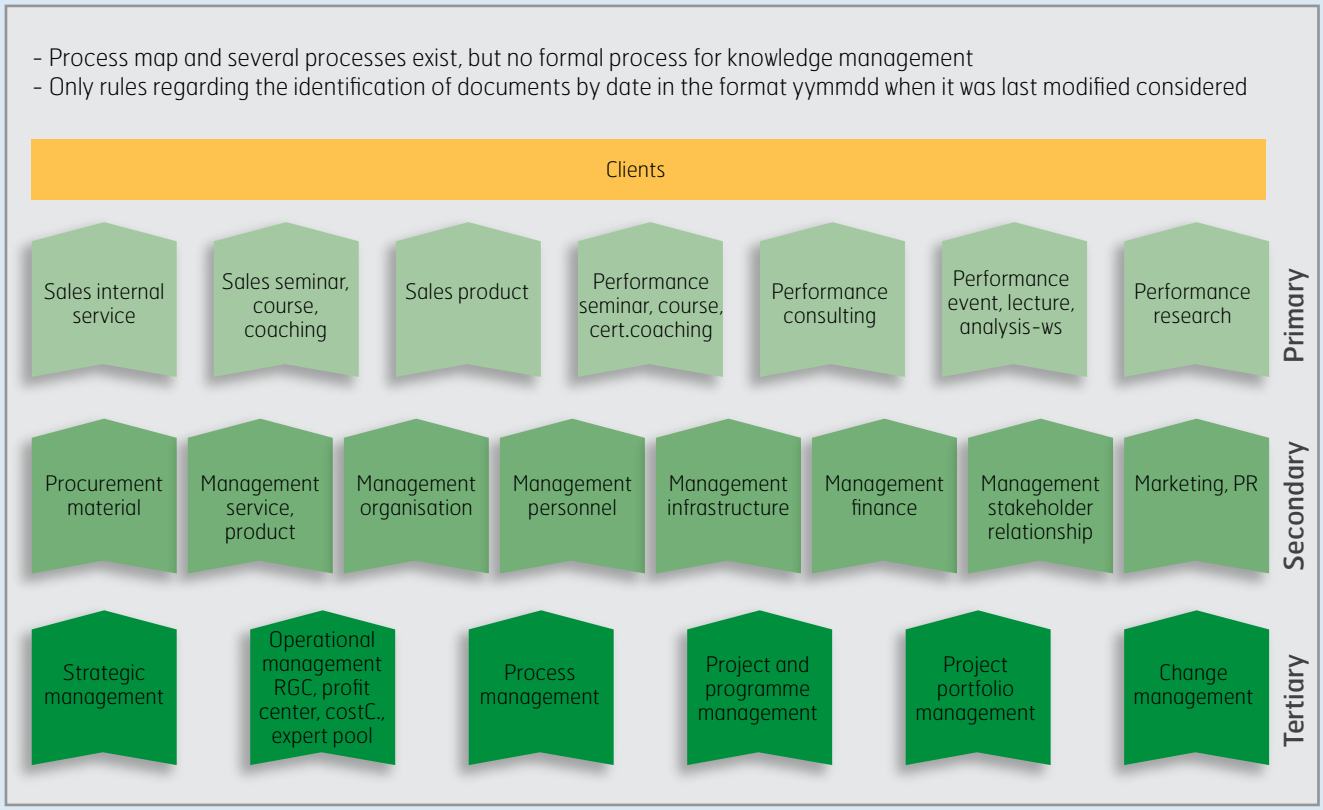

Figure 9. AS-IS Analysis – processes

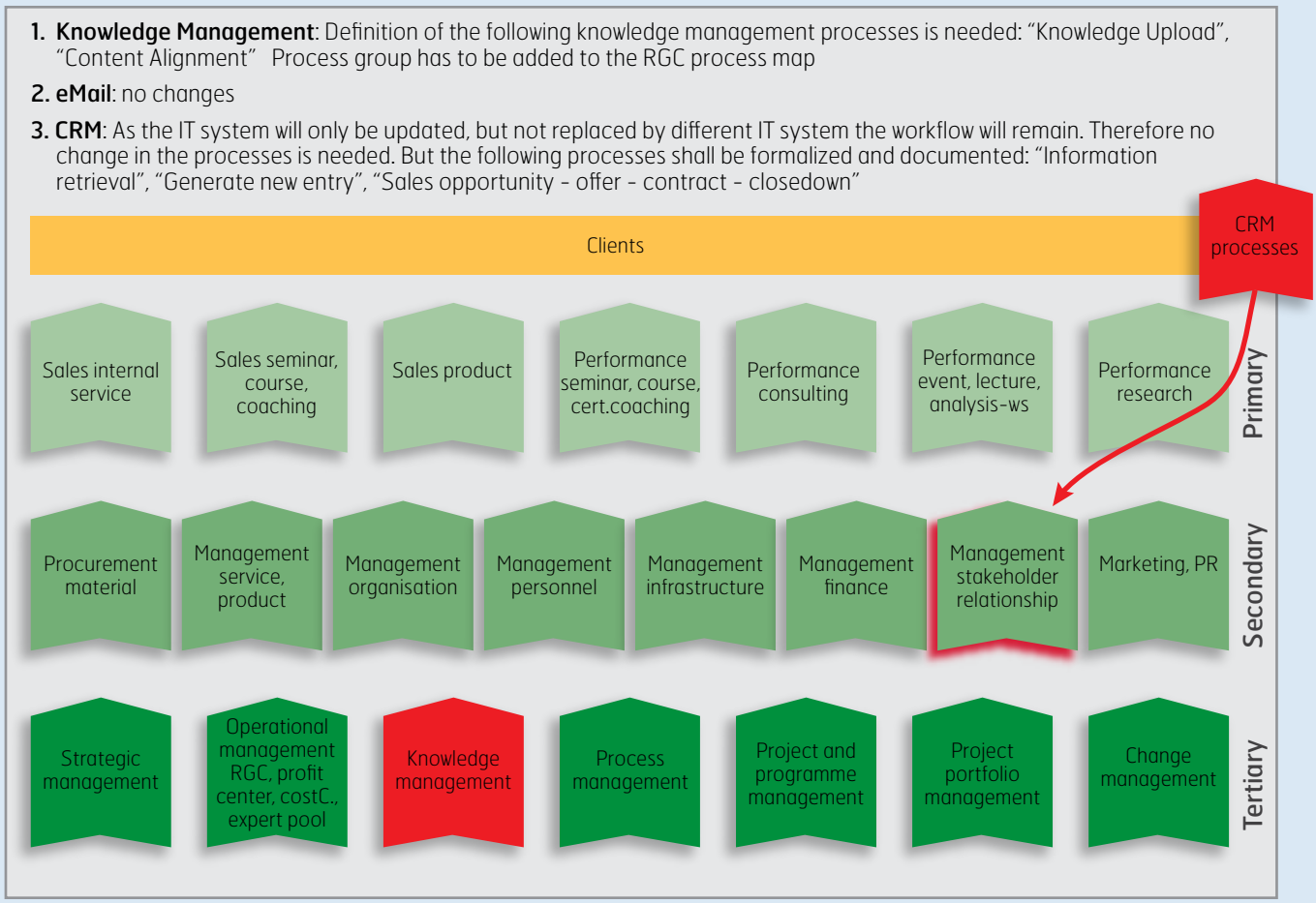

Figure 10. TO-BE Analysis – processes

Appropriate Leadership and Management of Complex Projects

This paper compares traditional linear projects with complex projects recognising there are a number of forms of complex projects. A number of examples are provided of complex projects. Various aspects of complexity are examined and reference is made to the classic literature on complex systems. A series of conclusions is drawn by the author illustrating lessons that can be learned from complexity concepts which are relevant to managing complex projects. Lessons include the importance of the project environment or context, the existence of a unclear stakeholders and project boundaries, the project being sensitive to initial conditions, the need for distributed leadership, encouraging bottom-up or self-organisation by staff, and the need to recruit using different competencies to traditional linear projects. An initial contribution to assessing cultural complexity has been made.

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Introduction

This paper explores complex projects, which are primarily projects which include autonomous independent systems. Examples of these autonomous independent systems include software developed primarily for another purpose, and which still has a life of its own operating in parallel to the current system of interest. A quite different example includes operating in a foreign culture, in which legal systems, methods of decision making, the role of religion in society, and other aspects, are all very different to what the project initiator and manager are familiar with.

Such complex systems will be explored and the distinction from traditional linear systems outlined.

Complicated projects

Complex projects are those which include autonomous independent systems. These are systems which have a life of their own in parallel to their use on the current system. An example is a piece of software which is being used by multi-projects but which is being built into your project because of the additional power gained. A simple example is the use of a global positioning system however a more complex example would be the use of the United States air force communication system by Australian forces in Afghanistan.

A number of authors have endorsed the concept of complicated verses complex projects, including Snowden, & Boone (2007), Glouberman, & Zimmerman, (2002) and Cotsaftis, (2007). A complicated projects is essentially linear and this means that scope cost and time can be predicted and this prediction then used as a monthly review tool to take corrective action, if scope is not achieved, or time and cost exceeded. A sharp distinction between complicated and complex is that making a jet engine is complicated while selling jet engines is complex, because of the autonomous independent systems of the customer and the jet makers competitors.

Examples of complex systems

Traditional System of Systems (SoS)

The traditional form that will be used as an exemple will be the Air Operations Centre of the US Department of Defence. Norman and Kuras (2006) report that the SoS includes 80 autonomous and independent systems, none of which were designed for the SoS of which they are a member.

Supply chain

A traditional simple supply chain for a product may have the following members: the manufacturer, a courier or initial deliverer, a warehouse which sorts the products from various manufacturers into groups, which deliver items to a local recipient, a second courier from the warehouse to a city centre, where

products are sorted again, and a third courier, and finally the customer or recipient of the product. Each of these systems are initially autonomous and independent.

Enterprise SoS

Typically an enterprise is a complex system with its customers and competitors operating as autonomous and independent systems.

Federal government

The operation of a federal government with clearly defined powers for both the national government (such as defence and taxation), and powers for the states, over health and education in Australia, and only very limited powers to tax allocated to the states, provides an interesting example of a complex system worth exploring.

Operating in an unfamiliar business environment

In this case the environmental systems, such as the legal, cultural, decision making, property rights, religious adherence, communication, transparency and other systems are very different to those in the home environment.

Disaster management

Disaster management is also an example of a complex system which has been managed as a top-down fashion with governments taking the lead. However, there are over 180 organizations in the Australian state of South Australia, with responsibility for disaster management. These 180 organisations are essentially independent. Only limited hierarchies are specified such as between fire, police and ambulance services.

Relatively wicked problems

A range of problems require a number of system thinking techniques to address them. Bosch et al (2013) addresses the conflict between tourism to create funds to develop a region in Vietnam and the potential damage to the environment. Tools used include generation of mental models, analysis of the implications by system dynamics and then identifying where leverage points occur in order to achieve the best benefit from expenditure.

Wicked problems such as dispute resolution between warring nations

There are many examples of the need for dispute resolution between nations which engage in war or relatively violent actions to each other. Examples include the Irish English dispute, which lasted for almost 400 years, the Turkish Greek dispute in Cyprus since 1974, the Israeli Palestinian dispute, which has gone for many years with little progress towards a resolution, and many others. This example fits Jackson's example of system which are 'interconnected and complicated further by lack of clarity about purposes, conflict, and uncertainty about the environment and social constraints' (2003).

> 'What project management can learn from the complexity sciences in managing complex projects'

Comparison of complex projects

A comparison of these complex projects can be seen in Table 1. The conclusions from this analysis are:

a. Cultural complexity tools to describe, assess, and assist people dealing with cultural complexity need to be developed and formalized for both traditional SoS and other culturally complex systems;
b. Moving to a more directed system from an a virtual system brings benefits for supply chain management;
c. States in federal systems often need to be overruled for the benefit of the overall system; measures to assess equity in sharing assets such as water would be helpful;
d. Modeling failure of the world financial system can be addressed by assessing stability levels;
e. Trust and bottom-up programs are very effective for managing projects with few formal controls;
f. Bottom-up self-organization by communities is essential in dealing with pre disaster preparation and post disaster management;
g. Bosch's technique of Evolutionary Learning Laboratories (Bosch et al, 2013) appears more useful that the Checkland Soft Systems approach for resolving very complex systems issues such as dispute resolution, although there are similarities;
h. Empathy, education & economic integration assists solution of wicked problems.

Further investigation of cultural complexity would assist project analysis. This point is taken up later.

Emergence

Emergence, occurs as new characteristics and behaviors emerge from simple rules of interaction. Individual components interact and some kind of property emerges, something you could not have predicted from what you know of the component parts; surprises that cannot even be explained after the fact are of greatest interest (White 2007).

Examples of emergent properties are structure, processes, functions, memory, measurement, creativity, novelty, meaning, social structure, human personalities, the internet, consciousness and even life itself.

The principles of emergence mean that over-controlling or top-down approaches will not work well within complex systems. In order to maximise system adaptiveness, there must be space for innovation and novelty to occur.

Complex project characteristics

Project environment

Both the external environment and the internal context of the project play a very important part in complex systems. Stevens (2008) provides a project Profiler which is used to assess a number of project components including the project context (Figure 1).

Management of complex projects need to monitor changes in the external environment. While it is often recognised that on traditional and linear projects the role of program or portfolio managers is to shield the project from environmental changes, it is even more important on complex projects.

Unclear stakeholders

Mason and Mitroff (1981) believe that most organisations fail to deal properly with wicked problems because they find it dif-

ficult to challenge accepted ways of doing things, and approaches which diverge from current practice are not given serious consideration (Jackson 2003:141) They developed Strategic Assumptions Surfacing and Testing (SAST), which attempts to surface conflicts and to direct them productively as the only way of eventually achieving a productive synthesis of perceptions.

The debate can be guided by asking questions, including:

- How are the assumptions of the groups different?
- Which stakeholders feature most strongly in giving rise to the significant assumptions being made by each group?
- Do groups rate assumptions differently (eg as to their importance for the success of the strategy)?

Knowing who can contribute to your project, who will benefit or be disadvantaged, are all important, however the most important is a statement to the project team of the current status of who are stakeholders. The current list should be tested and amended regularly and then published to project team members.

Unclear boundaries

A key difference between traditional and complex projects is that complex systems boundaries are unclear and can change. Ulrich (1983) felt that, in trying to grasp the whole system, we inevitably fall short and produce limited accounts and sub-optimal decisions based on participative presuppositions. To correct this we need to unearth the partial presuppositions that underpin the 'whole system' judgments we make.

Ulrich's 12 boundary questions include: who ought to be the client (beneficiary) of the system; what ought to be the purpose of the system; and, what ought to be the System's measure of success?

These boundary questions should be tested as early as possible in the project and regularly updated on complex projects.

Sensitivity to initial conditions

The initial conditions of complex systems determine where they currently are and, consequently, two complex systems that initially had their various elements and dimensions very close together can end up in distinctly different places due to their nonlinearity of relationships. Changes are not proportional and small changes in any one of the elements can result in large changes in the current position (Ramalingam et al 2008:27).

Phase space addresses the evolution of systems by considering the evolution process as a sequence of states in time. A state is the position of the system in its phase space at a given time. At any time, the system's state can be seen as the initial conditions for whatever processes that follow. The position of a system in its phase space at any time will have an influence on its future evolution. All interactions are contingent on what has previously occurred (Ramalingam et al 2008:27).

The implication for the management is to identify the relevant phase types through which the project is travelling. This requires sensitivity to political, financial or economic, marketing, environmental, technological, legal and a range of other issues. This requires members of the team having such sensitivities, which has implications for recruiting.

Self organisation

Self-organisation is a form of emergent property and supports the notion that complex systems cannot be understood in terms of the sum of its parts, since they may not be understood from the properties of individual agents and how they may behave when interacting in large numbers. Racism provides an example as a result of segregated neighbourhoods in that racial attitudes develop. The economy is a self-organising system.

Mitleton-Kelly (2003:19-20) points out that self-organisation, emergence and

Complex System example	Main Objective	Secondary objective	SoS Type	Hitch-ens' Scale of complexity	Bar-Yam's Scale	Bar-Yam's Variety or Complexity	Culture Complexity	Tools	Insights
Trad SoS	Use existing assets	Reduce emergence	Directed	Lev 2-Lev 5	L-H	L-H	L-H but not readily acknowledged	Only tools for technical issues	See conclusion a*
Supply Chain	Integrate software	Product tracking	Acknowledged	Lev 3	L-M	M	Not usually an issue	Tools to provide common interfacing and product description	See conclusion b*
Federated Government	Integrate economies	Integrate issues functions	Collaborative for rivers; Directive for economies	Lev 5	H	H on issues with state's powers	Can be an issue with migration	Enterprise architecture	See conclusion c*
World financial system	Support business and individuals	Remain stable	Virtual	Lev 5	H	H due to integration of systems	L	Model of failure required	See conclusion d*
Cultural complexity - Afghan school	Support marginalized people	Recipient takes control	Directed but based on trust	Lev 1	L	Working in multi-cultures	High	Tight reporting system for mainly volunteers Scenario analysis and System dynamics	See conclusion e*
Disaster management	Prepare for and manage disasters	Community support by volunteers	Mainly virtual	Lev 3	Low	Low	Low	Bottom-up self-organization	See conclusion f*
Relatively wicked problem	Resolve conflicts between objectives	Create acceptance of common meaning	Acknowledged	Lev 4	Low	Med	Low	Identifying meaning, system dynamics, identifying leverage points	See conclusion g*
Very wicked problem - Dispute resolution between warring nations	Create peaceful relations	Avoid violence	Virtual at most	Lev 1	H	H	H	Checkland's soft systems + scenario planning to encourage looking forward or Bosch	See conclusion h*

NOTE: L = Low; M= Medium; H=High; Lev = Level *Conclusions in "Comparisons of Complex Projects"

Table 1 attempts to relate the examples of complex systems discussed.

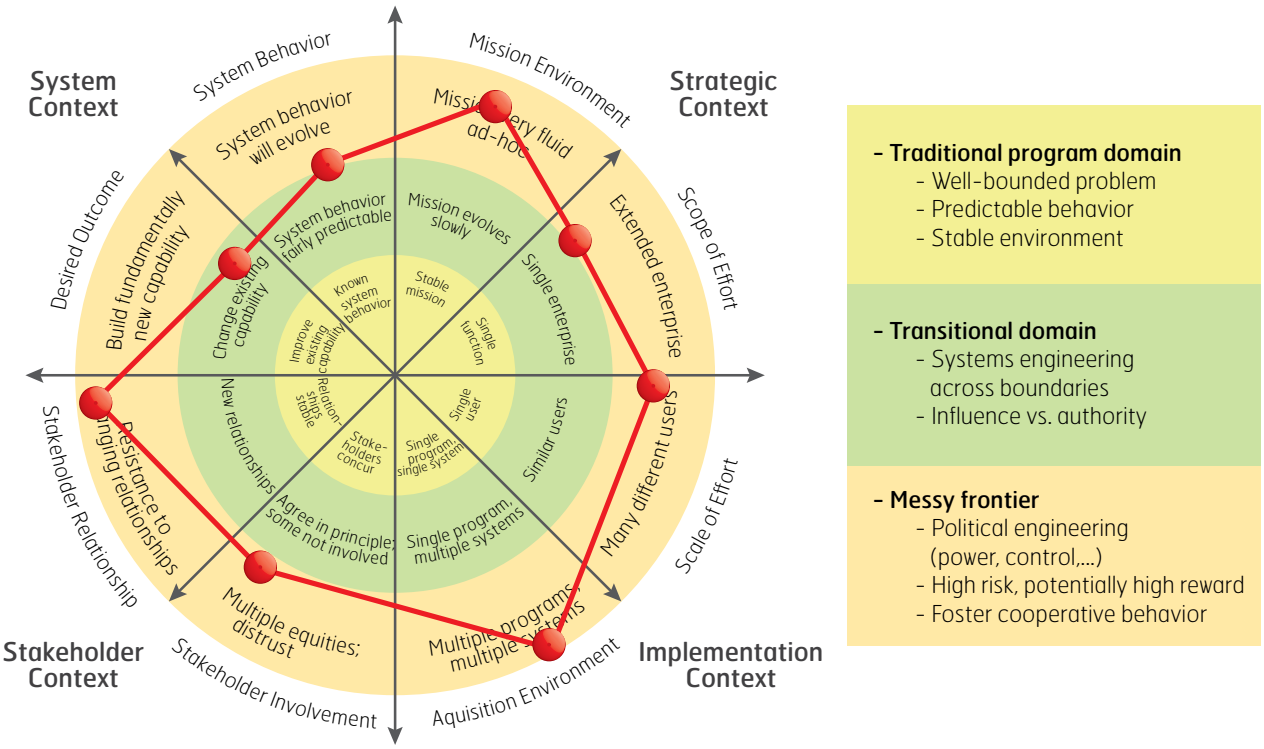

Figure 1. Stevens (2008) Enterprise Systems Engineering Profi

the creation of new order are three of the key characteristics of complex systems. Self-organisation may be described in an organisation when a group spontaneously comes together to perform a task.

Westley et al. (2006) argue that: 'Bottom-up behaviour [leading to self-organisation] seems illogical to Western minds ... we have a hierarchical bias against self organization ... [which is displayed in our common understanding of how human change happens, especially in organisations]. Our popular management magazines are filled with stories of the omniscient CEO or leader who can see the opportunities or threats in the environment and lead the people into the light. However, self-organisation is critical to achieving change.'

While project leaders have always recognised the benefits of initiatives by team members, self organisation is in some ways a direct opposite to the top down reductionist project manager. However self-organisation becomes particularly important in some major projects such as resolving a dispute between warring neighbours. Resolution of the English-Irish dispute was assisted by Irish mothers telling the IRA to get rid of their weapons. Similar examples exist in the Israeli and Palestinian dispute with schools being initiated for joint teaching of Arab and Jewish children.

On complex projects this becomes even more important and is part of an approach to distributed leadership.

Distributed leadership

Marion and Uhl-Bien (2001), commenting mainly on the operation of enterprises rather than projects, make the following points that 'Leadership should be on how to foster and speed up the emergence of "distributed intelligence", which is a function of "strategically relevant human and social capital assets—the networked intellectual capabilities of human agents'. Complexity driven leaders need to influence networks, creating atmospheres for formation of aggregates and meta-aggregates.

Marion and Uhl-Bien (2001) recognise that, 'complex leaders understand that the best innovations, structures, and solutions to problems are not necessarily those that they, with their limited wisdom, ordain, but those that emerge when interacting aggregates work through issues. Part of the role of leaders may involve exerting interpersonal influence (e.g., relationship-oriented behaviour), but part of it may not (hence, the broader definition of leadership)'.

They emphasise that the role of leadership on complex projects needs to move away from "providing answers" or providing too much direction (e.g., initiating structure) to creating the conditions in which followers' behaviors can produce structure and innovation. There obviously are risks involved in this strategy, for failure can also come from surprise.

Hence a leader's behaviour cannot necessarily shape a set of future conditions (McKelvey, 2000). They comment that command and control leadership may be a barrier rather than a gateway to organisational success. Marion and Uhl-Bien (2001) comment that 'because of the very nature of the uncertainty, unpredictability, and nonlinearity—the microdynamics — that characterizes complex systems, such behavior, is inevitable in complex interacting systems. Yet, complex behaviour is also stable in a very complex way.

Marion and Uhl-Bien (2001) comment that 'this bottom-up approach to resolving constraints is effective for dealing with complex networks of conflicting constraints, conditions that would stymie topdown efforts to resolve. Correlation among individuals and aggregates leads to a measure of dependable coordinated behaviour—perhaps more so in some types of organizations than in others'.

Marion and Uhl-Bien (2001) see the importance of networked intelligence of its constituent units. That is, autocatalysis depends on emergent distributed intelligence (i.e., the networked intellectual capabilities of human agents; McKelvey (2000), which cannot be directed but can be enabled by leaders). 'Autocatalysis involves catalysts (or tags), which are events or things that speed up a process that could conceivably occur without the catalyst, but that would take forever to do so'. Examples of catalysts a changing roles of individuals in the project team. Marion

COMPLEXITY CONCEPT	TRACKING
Networked versus hierarchy	Extent of networked versus hierarchy systems;
Project environment	Extent to which the project environment is recognised and the range of environmental influences measured;
Unclear stakeholders	Identification which stakeholders may be unclear, whether environmental and contextual scans are conducted, and the number of additional stakeholders added during the project;
Unclear boundaries	Extent of which boundaries are unclear; steps are taken to clarify these;
Sensitivity to initial conditions and changes to system	Identification of early phases of the system and identification of extent to which these need to be managed;
Self-organisation	Identification of whether the leadership encourages self organisation by staff and staff groups
Distributed leadership	Extent to which leadership is top-down versus distributed amongst team members and how the project manager is managing to cope with distributed leadership while remaining responsible for objectives attainment and cost and time management;
Recruitment of staff	Extent to which recruitment of staff seeks people who are comfortable with ambiguity and have high Emotional Quotients.
Recognition of cultural differences	Tools have not been developed yet.

Table 2. Tracking of project characteristics, in addition to those shown in Table 1.

and Uhl-Bien (2001) point out that such can include 'a new technology, an idea, a symbol, a symbolic act (the beating of Rodney King in 1992 was a symbol of police brutality and prejudice in Los Angeles), a group myth, or a belief. A tag can also be a leader, and this application of the concept is particularly important in this article'.

Marion and Uhl-Bien (2001) raised the issue of coupling patterns within units of the organization. Loose structures 'are important for two reasons: (1) they allow local adaptations and, likewise observed this benefit in his treatment of loosely coupled systems) and (2) looseness allows some systems to weather rampant, damaging change, as when there is a significant downturn in market conditions'.

Marion and Uhl-Bien (2001) point out that when an individual controls group behaviour, the group behaviour can be no more complex than that individual. That is, top-down control leads to relatively unsophisticated innovations and fitness. McKelvey (2000) rejects traditional images of heroic, visionary leaders charging ahead of their workers to lead them to productive utopia. He and complexity theorists in general argue that the greatest creativity, productivity, and innovation comes out of people who are provided opportunities to innovate and network—the bottom-up principle'.

Furthermore, leaders of complex projects should foster network building. Marion and Uhl-Bien (2001) recognise that 'Leaders generally felt that it was their responsibility to enrich connections in the system—that is, to forge new connections where none existed or to improve existing connections'. Networks provide the structure within which innovation can emerge and grow'. Furthermore, complex leaders will help catalyze network-building as well. This involves 'extending decision-making powers to their staff, and trust (plus expect) them to utilize the responsibility well. They encourage communication among the components of their aggregates, meta-aggregates, and meta-meta-aggregates'.

A question arises, concerning control. 'If complex leaders are influencing rather than controlling, how can organizations function? For example, many managers need to spend considerable time controlling (e.g., dealing with problem employees, enforcing rules and regulations, etc.) to enable the organization to survive. How does this fit within the framework of complex leadership? Part of the answer to this question lies in the distinction between leadership and management. Marion and Uhl-Bien (2001) note that 'complexity theory can expand this perspective (empowerment) by suggesting new areas of endeavor. For example, it might be productive to explore the impact of moderately coupled networks on empowered work groups, or the relation of empowered work groups to emergence and fitness. Decentralized businesses offer a ripe laboratory for studying the optimal conditions for emergence. Taking cues from critical theorists, one could explore the degree to which leaders actually do relinquish power in decentralized organizations, and the manner in which subtle control strategies, such as manipulation of the reward structures, that affect emergence and innovation'.

Recruitment of staff

Helmsman (2008) has found that staff working on complex projects fit in more readily if they have the following characteristics: Abstract Reasoning; Business acumen; Emotional intelligence; Problem disaggregation; Abstract problem solving; Understand perspectives; Systems Thinking; and, Leadership/Mentoring skills.

It is important to all t o include staff with significant levels of diversity, in terms of gender, race, religion and educational background.

Developing a cultural complexity assessment tool

There are a range of aspects which can be included in a cultural diversity assessment tool. These include ethnicity, the state of the economic system, the role of governments, the extent to which the culture is traditional and conservative, the extent of education, attitudes to gender, tribal codes such as honour, revenge and hospitality, tribal identity, and loyalty being communal and public and the extent to which they take precedence over individual identity and private loyalty, self-interest and personal gain outweighing the fear of retribution or legal/punitive action and hypocrisy or loss of respect, the extent to which decisions are made by consensus, the extent to which defence and control of assets, women, gold and land are relevant and finally the extent to which hospitality is an essential aspect of culture (US DoD, 2009, reporting on Afghan culture). In comparison, Crisp and Turner (2011) note that psychological and behavioral outcomes will occur when cultural diversity occurs in a way that challenges stereotypical expectations. Bush and Ingram (2001), examining cultural diversity between salespeople and their potential customer, have found that training in recognition of cultural differences improves behavioral outcomes. Finally, Freedom Watch (2011) , of the US defence forces in Afghanistan, illustrates a range of practices cultural differences.

This brief examination illustrates the need for more comprehensive study of this topic and development of an assessment tool.

Tracking complex project types against indicators

Tracking is shown in Table 1 however further aspects of complex projects, which require tracking, are shown in Table 2. A better understanding of these characteristics will assist management of complex projects.

Conclusions

Many management aspects have been found to require amendment when one moves from a focus on traditional linear projects to complex projects. Complex projects have been found to include projects in which there is an element of autonomy and independence. This can occur through the inclusion of systems which were designed for other purposes, but which have been included in the current project because of the power gained. It is noted that this practice is encouraged by the US DoD.

Other examples of complexity occur through operating in an unfamiliar environment where the laws and cultural practices are very different to one's experience. Another example can include the case where there is conflict in the leadership of the project, as occurred between the Navy and army and air force when the US forces entered Afghanistan following the twin towers bombing. A final example of a complex project occurs with wicked projects.

It is particularly important to manage the relationship between the project and project context in the case of complex projects as a complex project is a much more sensitive to the changing environment. Examples of important changes to the management structures are discussed in this article and key aspects include the need for leaders to virtually eliminate the tendency to top down command and control and dopt distributed leadership through the project team. This can be done to encouraging bottom-up, or self-organisational behaviour. However the role of leader is also to manage in interfaces, suggest changed structures, encourage role changes, and a host of other behaviors. Development of tools to assess cultural diversity has been found to be very important however much further work is required on this.

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Serious games – A means to develop project management competences

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Project managers are increasingly challenged with skills that require management of multi-cultural and distributed teams that go beyond the technical project management skills. The challenges emphasize the importance of soft skills such as communication, leadership, building trust and decision making. Decision making is one of the important aspects of project management. Improving the ability of project managers to make appropriate decisions at right time can make a substantial positive difference in project work environments. The aim of this paper is to discuss serious games as an effective means of competence development, with a focus on developing decision making competence, for project managers. We present an approach for describing project management competences, which takes into account an individual's abilities and personality, knowledge, organizational factors and environment factors that define a specific situation; the OKEI (Organisation, Knowledge, Environment and Individual) competence modelling framework. We will present descriptions of soft skills in project management – decision making as an example – and discuss how serious games can contribute to support rapid competence development for project managers.

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Introduction

Modern project organisations face several challenges; for instance, globalisation and distributed work-teams. And, there has been an increasing focus on project managers developing their soft skills (such as communication, leadership and decision making) sufficiently in addition to their technical skills. Current project management training approaches are focused on certification and provide the basic training to manage projects (e.g. IPMA, 2006). The skills and experience to manage large, international projects are acquired from several years of managing such projects. How can such skills be developed in a relatively shorter period of time? Serious games is a means of supporting *rapid competence development* for project managers and can facilitate experiential learning for fresh project managers to gain a variety of project experiences in a virtual environment.

In this paper, we consider serious games as a means of training project managers and increasing

their competences. In this regard, we will look at decision making as an example. A "serious game" is a game designed for a primary purpose other than pure entertainment. The term "Educational games" is also used to describe games that are designed to teach a specific skill or enhance knowledge as we play. Educational games support a situated context for learning in a virtual world because when you learn by playing a game, you apply that learning immediately in the game and move on to learning new skills (Gee, 2003). Game scenarios and characters in the game that reflect the real world will enable a near-transfer of knowledge.

The learning environment of serious games that contributes to rapid competence development can be characterized by:

- The instant feedback on the choices of action that the learner makes
- Timely feedback on the overall performance of the learner at the end of every game-session.
- The possibility to play the game several times, choosing alternative paths of decisions every time based on reflection and experience gained from the previous game-sessions.

Designing serious games or similar virtual environments for supporting project managers to acquire their necessary soft skills requires a fresh look at the training approaches that are currently available. In this paper, we present an approach for describing project management competences which takes into account an individual's abilities and personality, the knowledge-areas that the individual deals with, organizational factors and environment factors that define a specific situation; the OKEI (Organisation, Knowledge, Environment and Individual) competence modelling framework (Petersen & Heikura, 2010) (Cowley, Bedek, Rabeiro, Heikura & Petersen, 2012). In addition, we will present descriptions of a soft skill in project management (decision making) and discuss how serious games may be used to support rapid competence development for project managers.

This work is a part of the European project TARGET (Transformative, Adaptive, Responsive and enGaging Environment, http://www.reachyourtarget.org/), which aims to revolutionise competence development for project, innovation and sustainable global manufacturing managers by providing technological support to reduce their "time to competence". The variety of alternative experiences and the rapid competence development that can be obtained by utilizing serious games have a positive impact on the decision making process. The impact can be seen in two major dimensions; firstly, serious games that focus on developing soft skills in general: in order to make appropriate decisions, project managers have to have knowledge and competence on the issues that they deal with. Their competence generally should incorporate contextual understanding as well as the dynamic and often unpredictable nature of the contexts. Serious games as a learning and testing arena allow (potential) project managers to see various responses and consequences of their decisions. Consider for example a negotiation scenario. To go through several alternative circumstances by choosing alternative paths (for instance, choosing and testing out different available options until the negotiation is successfully completed) help project managers to gain competence in the particular soft-skill. Developing soft-skills – such as negotiation, communication and trust building – all involve decision making as an underlying, inherent component; that means, when project managers apply serious games to develop their soft-skills, they develop their decision making ability too. Secondly, serious games that focus particularly on developing decision making skills. This special focus can yield a deeper understanding of the characteristics and dynamics of the decision making process.

The aim of this paper is to discuss serious games as an effective means of competence development, with a focus on developing decision making competence, for project managers. In particular, we discuss the relevance of the context in which a competence is applied to determine the ability of a project manager to apply the competence appropriately. The rest of this paper is organised as follows: Section 2 discusses the competence Decision Making in project management; Section 3 describes the OKEI Competence Modelling Framework; Section 4 describes the competence Decision Making using the OKEI Competence Modelling Framework; Section 5 discusses the contributions of serious games to competence development and Section 6 concludes the paper.

Decision Making

Organizations can be seen as decision making systems (Morgan, 1997). Project organizations are of course not exceptional. There are several models that describe the decision making process in organizational context. We will look briefly at rational and non-rational decision making models. As we see it, the rational decision making model focuses on a systematic way of gathering information, analysing the information, developing alternative solutions based on the analysis, evaluating the solutions and choosing the best solution to implement it. This is a structured and sequenced process. This model seems to assume that the decision maker has the capacity and capability to gather all relevant information, analyse it adequately, find and evaluate all relevant alternative options and then choose the best solution among the alternatives. Reasoning and logical thinking are some of the underlying themes of this model. The non-rational decision making model, as we see it, includes processes that are not – at least not entirely – based on rational reasoning. Some characteristics of this model include:

- Intuition based decisions (Simon, 1987)
- Bounded rationality of making good enough decisions (Simon, 1987) due to several reasons, for example human incapability to search, find and process all relevant information
- Organisational politics and power relations with other organisational members.

When describing their garbage can decision making model, Cohen, March & Olsen (1972, page 2) say

> *"[...] an organization is a collection of choices looking for problems, issues and feelings looking for decision situations in which they might be aired, solutions looking for issues to which they might be the answer, and decision makers looking for work. Such a view of organizational choice focuses attention on the way the meaning of a choice changes over time."*

The above description of the garbage can model can also be looked at with respect to organisational politics and bounded rationality that were mentioned earlier. Some political decisions as well as making good enough decisions (due to, for instance, time pressure or inadequate ability to process information) can illustrate the usage of garbage can decision making model.

In a real world situation both the rational and non-rational decision making models can be applied. As with the rational deci-

sion making model, the non-rational decision making model has its impact on the organisational world both at the individual and organisational levels.

OKEI Competence Modelling Framework

The OKEI (Organisation, Knowledge, Environment, Individual) competence modelling framework was developed to support the description of competences in manner that they can be used in serious games and simulation-based technology enhanced environments, to support competence development (Petersen & Heikura, 2010). In general, the OKEI competence modelling framework highlights the interdependencies and dialogue between intra-organizational factors (e.g. strategy, work organization etc.), external / operational environment factors (e.g. law, culture, infrastructure etc.), knowledge related factors (e.g. the existing body of knowledge relating to the work process, the bulk of which resides outside of any individual), and individual and personal factors (e.g. knowledge, skills, motivation, personality, mental models of work and intentions). The framework aims to function as a check list of the sort of contextual issues which are present in the actual contexts and situations where the learner will be applying the knowledge that he/she needs to acquire. In designing competence based learning games and simulations, the framework guides to list the relevant contextual factors (organization, environment, knowledge), in addition to the factors pertaining to an individual person, such as the personality, attitude or strength of character, which play a role in the application of a competence. In order to be able to do this, in most cases the competence needs to be elaborated and more detailed sub-competences need to be defined so that the relevant contextual factors can be identified. The OKEI factors Organisation, Knowledge, Environment and Individual are described below:

- **Organisation**: This dimension represents the organizational aspects that influence the work performance and the application of competences. These organizational factors include strategies, values and goals of the organization, work processes, organization structure, roles of people within the organization and e.g. the power structure embedded in people and functions. Also the competence profile that one is expected to have is mostly determined by the organization.
- **Knowledge**: This dimension refers to the external knowledge resources that could be useful to apply or exercise in the work task at hand. This does not refer to the knowledge already possessed by the individual, as that is categorized as an Individual factor. The knowledge resources referred to here may be academic, theoretical or practical.
- **Environment**: This dimension considers the context outside of the organization. The environment includes other companies and industries, networks, public sector and governance, the laws and norms, existing technologies and infrastructure, the market and culture, not to mention the people as consumers, users and citizens. These all play a role in defining the success of work performance.
- **Individual**: This dimension refers to individual and personal factors that may be applied in work situations and that have varying connections to ones performance level. Among other things, knowledge, skills, past experiences, personality traits, mental models, attitudes, motivation, intentions, perceptions and emotions can either be utilized in work tasks or they influence the work tasks in some way.

The OKEI competence modelling framework provides a way for describing contextualised competences in serious games (Bedek, Petersen & Heikura, 2011), where the game scenarios that are played by the players of a game contribute to developing relevant competences and applying the competences appropriately in context.

Examples of Competence Descriptions

In this section, we will present an example of descriptions of competences (decision making) to illustrate how the OKEI competence modelling framework can be used to contextualise competences and how that can be beneficial for supporting competence development in serious games. These descriptions of competences are derived mainly from our reflection on IPMA Competence Baseline (IPMA, 2006). Other management literature also contributed to develop our understanding on this topic.

As we can see from Table 1, decision making competence incorporates aspects that are associated with both the rational and non-rational decision making models. The ability to deal systematically with the decision making process as well as the ability of utilising intuition and creativity are some key individual factors. Knowledge about the task, organisational context, power relations and interpersonal relationships in organisations are considered in organisational factors. In addition, there are knowledge and environmental factors

Organisational Factors	Knowledge Factors	Environmental Factors	Individual Factors
- Knowledge about his/her own position and power in the organization - Knowledge about the task, and organizational context - Knowledge about others who would be affected by the decision - Knowledge about organizational culture - Knowledge and acquaintance of internal experts and sources of relevant information in the organization	- Theoretical knowledge of the issues that are relevant with respect to the decision. - Knowledge about contracts and how they are practiced Knowledge about different cultures - Theoretical knowledge about decision making and problem solving - Statistics / probability theory Simulation (Monte Carlo) Knowledge about cost-benefit analysis	- Knowledge about relevant laws and regulation and how they are practiced. - Knowledge and acquaintance of external experts and sources of relevant information - Knowledge about current news and future trends (local, national and global) External information that is needed - e.g., reputation of a person who can be employed in the project	- Ability to collect important and relevant information - Ability to understand how different, important factors affect each other - ability to have a holistic understanding - Ability to avoid information-overload and analysis-paralysis. - Ability to communicate effectively - Ability to exercise influence on others constructively - Intuition and creativity

Table 1. Decision making

Figure 1. Scene in a serious game for communication in an informal context (Petersen & Ekambaram, 2012)

that characterise the decision making competence.

Other project management competences – for instance, leadership, communication and trust building – can also be described using the OKEI competence modelling framework. For more information, please refer to Petersen & Ekambaram (2012). It is also to be noted that these competences – for example, decision making and leadership – can relate to each other, and the ability to make decisions plays an important part in applying other competences too. In theory too, we can see this relation: Vroom & Yetton (1973) talk about leadership styles when discussing their decision making model.

Contributions to Competence Development

The prompt interactive nature of serious games allows the user to receive instant feedback on his her choices of actions. Feedback on the user's performance can also be provided at the end of each session of the game or during game play. In addition, playing the game several times allows the user to go through different alternatives of the context or the situation in which a competence may be applied, and hence, it provides the user various instances of learning.

One of the scenarios that we focus on in the TARGET project is a project manager negotiating with a local farmer to acquire some land to build an access road for a windmill farm. In the example, it is not only the farmer that the project manager has to communicate with to either negotiate for something, convince them of the benefits the windmill farm will bring or to obtain the goodwill of the community. The project manager may have to have a good relationship with the mayor of the city, environmental activists as well as the local businessmen. In order to ensure or facilitate that the negotiations go in a right direction, the project manager has to take appropriate decisions on the way: How to approach different, important stakeholders, how to communicate with them in order to obtain relevant information that may be useful to make decisions, what kind of options that the project manager can provide to them and when, etc. (TARGET, 2012). The negotiations may take place in different contexts; e.g. negotiations with the farmer may take place at the farm in an informal context as shown in Figure 1, while negotiations with the mayor or a local business person may take place at an office in a formal context as shown in Figure 2. In a serious game environment such as TARGET, every time the project manager makes a choice of action or a response, then the system will respond to it, and thus leads to continue the interaction. Through the project manager's choices of action and the interaction, the user can develop the intended competence. If decision making is the intended competence to develop, then this competence development will focus on the factors that are mentioned in Table 1.

The following aspects can be seen as some of the key contributions of serious games to competence development:

- **Timely interaction and feedback**: Responses from the serious game environment can lead the user to reflect on what he/she does – reflect on how the interaction progresses as well as his/her choices of action, while the interaction / play goes on. This can be seen as, what Schön (1998, page 141) calls reflection-in-action. Furthermore, Schön says that, *"Reflection-in-action necessarily involves experiment".* Experimenting can be seen as a source or instance of learning. This experimenting is done in a safe and interactive manner in serious games. Schön also describes another concept called "reflection-on-action". When the user plays the game one more time, then the user would reflect on what he/she did in the previous playing session(s), and accordingly take actions (modified choices of action) in order to obtain better results this time. Reflection-in-action and reflection-on-action are acts that contribute to making sense of the situation, which can in turn facilitate better decision making. Furthermore, interaction, feedback, reflection, and

Figure 2. Scene in a serious game for communication in a formal context (Petersen & Ekambaram, 2012)

the possibility for the user to play the game several times can also be looked at in connection with creating more learning experience for the user in a comparatively shorter period of time, and thus facilitating rapid competence development.

- **Learn from mistakes**: Serious games provide a safe environment to learn from mistakes and for experimentation; learn from making wrong decisions. Unlike in the real world, there will be no damage or cost due to any wrong decisions that are made in serious games. Mistakes provide opportunities to learn from. In a video published on BBC's website, the CEO of Lego, a Danish toy company, Knudstorp (2012) says:
  "The ultimate survival technique is experimentation. When you experiment, you have also said that you are willing to fail. Failure is best way to learn."
  Even to make wrong managerial decisions (in a safe learning environment such as serious games) and understand the consequences of them is an effective way to obtain valuable knowledge.
- **Context**: Serious games, among other things, provide a context and thus enrich the user's learning of core knowledge elements that are situated in / integrated into the context. The context can be considered as the situation in which the competence is applied, which includes the people that are involved in the situation, perhaps their personal qualities, workloads and competences, the organisational culture or the country in which the situation takes place. Understanding the context in which the knowledge is applied is very important; for example, one can compare decision making with respect to different stakeholders in different contexts. Different contexts such as the ones shown in Figure 1 and Figure 2 may require different approaches in a negotiation or a decision making process, affecting the behaviour and responses of the different parties involved. Understanding the context and the appropriate actions and responses in the different contexts is a part of mastering the competence of decision making.
- **Holistic understanding of the work situation**: Task that an employee does in a project cannot be looked at an isolated operation, at least in most circumstances. It is important to know how the task influences and is influenced by other tasks of the project. The notion of systems thinking can be considered here. According to systems thinking, the focus will be not only on elements that constitute a system, but also on how the elements are interconnected and interact with each other (Senge, 1990). Serous games provide this holistic, systemic understanding. Serious games can develop the holistic understanding of decision making by presenting consequences of decisions and allowing the user to try the decision making process several times with various alternatives, in different contexts.

Concluding Remarks

In this paper, we have discussed serious games as an effective means of competence development for project managers. In particular, we have discussed the relevance of the context in which a competence is applied to determine the ability of a project manager to apply the competence appropriately, and presented the OKEI competence modelling framework as a means of describing competences as such. We have presented an example of competence description (decision making) that takes into consideration the context in which the competence is applied. Aspects such as prompt responses, timely feedback on the user's performance at the end of each game-session and the possibility to play the game several times in a safe environment can lead to rapid competence development through experimenting, reflecting, making trial and error and sense-making.

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Facilitating a No-Blame Culture through Project Alliancing

Project and Program Alliancing contractually demand a 'no-blame' culture in a form that is unique to this project procurement form yet we see surprisingly scant literature on how this is facilitated within a construction project management context. The purpose of this paper is to demonstrate how a no-blame culture in Australian project alliances is made possible. We argue that it is inextricable linked to behavioural drivers. Foremost of these is that all parties to an alliance create a culture of openness and willingness to share the impact of the consequences of working together, making unanimous decisions as a single entity and jointly accepting legal responsibility and accountability. This culture requires that each collaborating party be protected from a project-internal threat of being blamed and subsequent litigation by project team colleagues.

We draw upon theory and data gathered over several recent research studies on the experience of project alliances in Australia. The project alliance procurement form has a unique 'no-blame' behavioural contract clause that is crucial in developing a collaborative culture where innovation can evolve through a process of trial and error.

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Introduction

Project delivery is not an end in itself. It is a means to an end and its purpose is to realise a benefit, transformation or strategic goal. Its mode of delivery can be designed through its project procurement strategy to bring about the planned output and outcome and to determine how the project management (PM) process is conducted (Walker, Arlt and Norrie, 2008; Department of Infrastructure and Transport, 2011b; Department of Health, 2012; HM Treasury and Infrastructure UK, 2013). However to be effective, PM requires effective integration and alignment of the overarching project vision established in the mandated project brief despite each of its multiple participants from various organisations having their own interests and agenda.

One challenge that has been evident from the PM literature is that project agreements and contracts are structured from the narrow perspective of each individual party within the project team to delegate risk management decision making (Williams, 1995; PMI, 2013). This generally makes sense, and is the 'norm' for most projects, to adopt a risk management strategy where each party takes responsibility for risky aspects that they are best equipped to deal with (PMI, 2013). However this leaves anomalies, gaps and ambiguities in project risk allocation for overall project delivery leading to confusion about where accountability boundaries may lie. Each project participant has a duty to protect the interests of their own organisation and is therefore obliged to engage in defensive routines to pre-empt or to counter potential claims or legal action. This has a disadvantage of constraining taking hard decisions due to the likelihood of being blamed (Walker, Lloyd-Walker and Mills, 2013).

Various attempts have been made through the evolution of project procurement approaches to integrate responsibility and accountability of project team participants more effectively (Winch, 2001; Turner, 2006; Williams, Klakegg, Magnussen and Glasspool, 2010). If project participants and their organisations can accept a way to act as a united single team that manages risk, responsibility and

accountability holistically in a best-for-project manner, then much managerial energy can be re-deployed to more creative and positive action. The rationale for this is that reducing the chance of conflict, litigation and dispute may lead to reducing the burden of administration and management effort devoted to defensive routines and actions by project participants. Designing a procurement form that encourages greater trust between project team members in their interactions and joint decision making is hypothesised to enhance chances of redirecting management energy towards making best-for-project decisions (Davis and Love, 2011). An important development in achieving closer whole-team best-for-project action has been the increasing use of relationship based procurement approaches that specifically addresses problems associated with the culture of blame in projects.

Partnering, in its many forms, tries to engender best-for-project and no-blame but it fails to embed 'no-blame' contractually clauses whereas more recent project procurement forms, notably project and program alliancing, does (Ross, 2003;2013). Thus project alliancing (PA) facilitates best-for-project decision making through the PA agreement (PAA) that contain four important conditions:

1. A required unanimous decision making process at the alliance management team (AMT) level and alliance leadership team (ALT) level;
2. Disallowing the right of participants to sue each other unless there is clear evidence of malice or illegality. If each party agrees to a decision, then one party cannot viably blame other parties to that decision and therefore has no valid grounds to take legal action or lodge a claim against other parties to that decision;
3. A pain/gain sharing agreement that reinforces the no-blame dimension because risk is shared so that all PA participants 'sink or swim together' (Walker, 2002); and
4. Specific behavioural requirements for project participants to respect each other, be honest and open with each other and to genuinely collaborate (Ross, 2003;2013). Therefore the PA agreement provides a vehicle for facilitating a no-blame culture.

Project alliancing (PA) is used on many complex infrastructure projects in Australia. Wood and Duffield (2009, p7) report that the total value of alliance projects between 2004 and 2009 in Australia was $32 billion. Similar forms of PAs with several but not all of the above fours conditions are used elsewhere. In the USA the term integrated project delivery is used (Cohen, 2010) and the Heathrow Terminal five (T5) project adopted a sophisticated integrated supply chain contractual form (Doherty, 2008; Brady and Davies, 2010). While some contractual nuances illustrate difference in the degree to which alliance partners collectively share pain and gain from the PA arrangements, a common world view prevails that projects present many challenges requiring collaborative decision making and action, and that plans are never perfect. Uncertainty is a common characteristic of complex projects, and innovation to seek pathways through adverse situations is a key need in effectively and successfully managing complex construction projects. The introduction of contractual conditions that embeds a no-blame clause into the PA agreement is central to determining behaviours that support collaboration where energy is redirected away from defensive routines towards constructive joint action. In this paper we will restrict ourselves to PAs because they specifically demand that alliance parties 'sink or swim together' (Walker, 2002) and this explicitly demands a no-blame culture.

The paper is structured as follows. First we briefly describe the paper's context in terms of fundamental constructs, such as 'no-blame' culture and construction project alliance. We provide an explanatory model to answer the research question and then discuss the results together with illustrations from practice to explore their implications. Finally, we conclude the paper.

Fundamental Constructs

We introduce two main constructs that we explain. These are PAs and blame.

True consensus requires skills in being empathic and being able to accept the perception of others as a valid negotiating point.

What do we Mean by Project Alliances (PAs)?

A project alliance agreement (PAA) is made between two or more entities—the project owner or its representative (PO) and consultants and contractors who are non-owners of the project (NOPs). All entities commit to working cooperatively in good faith, sharing the risk and rewards of the project in order to achieve the stated outcomes (Jefferies, Brewer, Rowlinson, Cheung and Satchell, 2006).

The above, together with our initial discussion of project alliancing in the introduction, suggests a no-blame culture where the immediate response of project team members is to fix a problem rather than apportion blame. Alliance parties' commitment to act in good faith and to sink or swim together through embedding powerful contractual incentives for contractual behaviour sets the tone of the alliance culture. This contractual arrangement provides a defining difference to other voluntary collaboration project delivery approaches. The commercial contract element is established to be fair and to balance the right of NOPs to make a fair profit with the right and obligation of the project owner (PO) to ensure that value for money is competitively achieved. A no-litigation PAA clause (unless there has been illegal acts or gross incompetence) replaces the normal rights to sue parties who do not perform to expectations with a collaborative, proactive, integrated and more responsive whole-project team approach to achieving key performance indicators (KPIs) and key results areas (KRAs) through linking incentives to behaviours. The behavioural contract element requires signatories to work together in good faith, acting with integrity and making best-for-project decisions. The incentivisation contract element ensures that the financial reward and penalty provisions drive motivation so that it is in

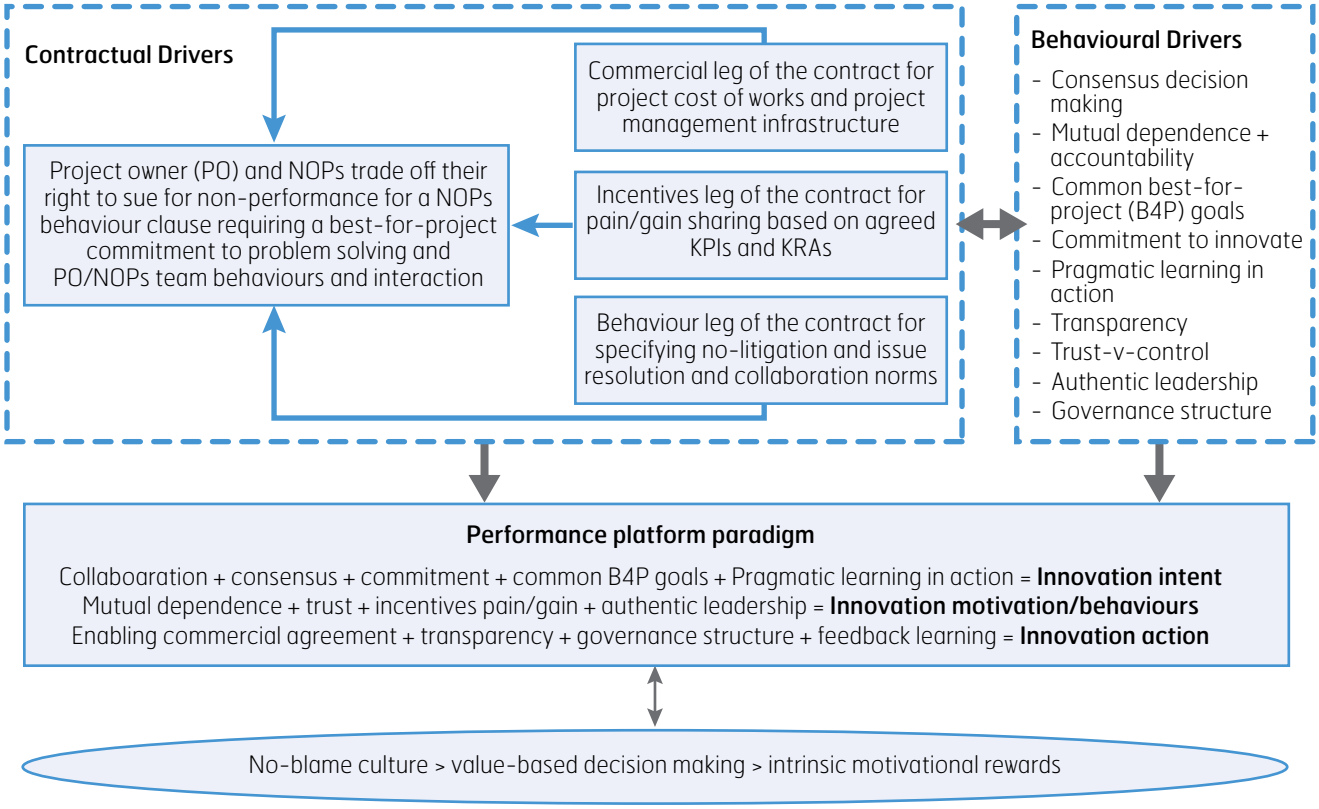

Figure 1. Characteristics and Impact of the no-Blame Culture

the interest of all parties to work closely to achieve best value.

What do we Mean by a No-blame Culture?

The National Alliance Contracting Guidelines Guide to Alliance Contracting (Department of Infrastructure and Transport, 2011a, p19) highlights several no-blame features including: good faith in acting with integrity in making best-for-project decisions; peer relationships; respect for others and their expertise: and *"... where each Participant has an equal say in decisions for the project. It is expected that all joint decisions made by the Participants will be best-for-project [...] The establishment of a 'no fault – no blame' culture underpins the alliance delivery method. It involves a commitment from each of the Participants that, where there is an error, mistake or poor performance under the alliance contract, the Participants will not attempt to assign blame but will rather accept joint responsibility and its consequences and agree a remedy or solution which is best-for-project. If the Participants disagree, they must work together to resolve issues in a best-for-project manner"* (p19-20). Figure 1 illustrates the dynamics at work.

A no-blame culture is predicated by contractual and behavioural drivers that deliver a platform for performance that has at its core a paradigm about the best way for the PO and NOPs to interact and conduct business. The NOPs' world view is shaped by their values and potential perceived rewards. Consensus decision making can only effectively be achieved if egos are set aside and participants who traditionally would be 'in charge' take the time and effort to genuinely engage in dialogue where they try to understand, re-interpret their own assumptions and judgements toward a mutually negotiated outcome. True consensus requires skills in being empathic and being able to accept the perception of others as a valid negotiating point. Consensus behaviours turn power and communication imbalances into symmetrical input mechanisms that allow consensus about a solution to emerge that has greater intellectual and experiential input that leads to greater commitment by all parties to the decision. The sink-or-swim contract condition in PAAs, along with the practical need for consensus building, means that accountability, transparency and mutual dependence are necessary. Trust and control dimensions provide an interesting backdrop to alliances. PAs closely resemble joint ventures in their shared goal and requirements for integration and collaboration with features of high trust and high control (Das and Teng, 2001) similar to the high trust and simultaneous distrust described by Lewicki, McAllister and Bies (1998). The high control aspect in PAs is generally monitored through adherence to KPIs and an open-book approach to probity and auditing. This provides both trust and what may be perceived as distrust. Alliance members trust the governance arrangements, and integrity of probity of those that audit them through open-book access to their financial and business records.

A no-blame culture develops from these features because consensus means that if all agree to a course of action then individuals can hardly opt out when they feel it inconvenient. The transparency and open-book approach lowers fears that any party can 'cheat' the system. Mutual dependency binds participants more closely together because the incentive contract rewards project, not individual, performance. The signing off on agreement to strive for best-for-project decisions triggers an important behavioural mind-set to aim for pragmatic action. All strive for best-for project outcomes with an understanding that this involves trying new approaches and recalibrating efforts pragmatically when better understanding

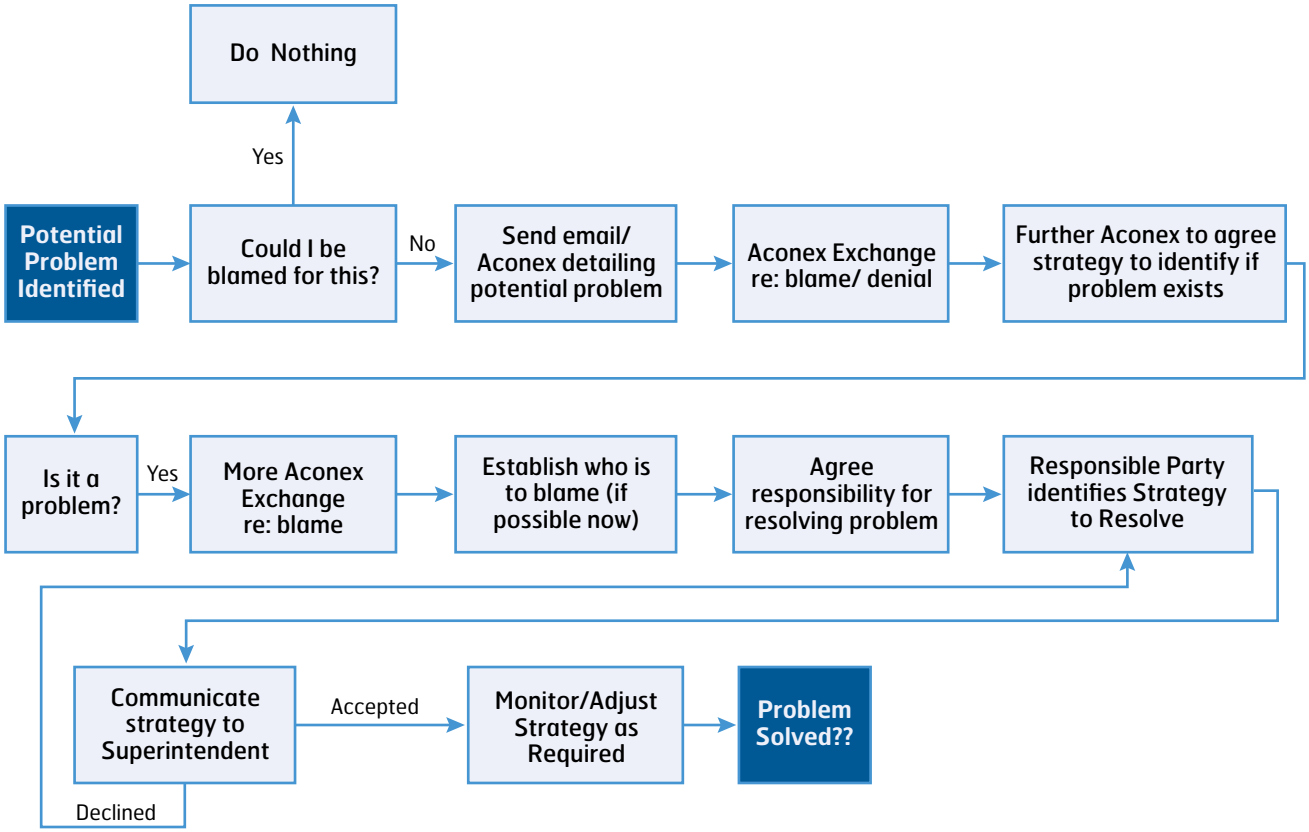

Figure 2. Typical Business-as-usual Problem Solving Model (Pitman, 2012)

of the context require plans to be changed.

Authentic leadership is an important PA behavioural trait in which leadership action is aligned with rhetoric and is consistent with liberating team members to maximise their contribution and a best-for-project attitude is demonstrated. Leadership may be officially vested in the PA manager but in reality it is distributed because individual project team members take the initiative when and as required based on their expertise, contribution and input into best-for-project decision and action outcomes.

Finally, the PA governance structure supports the behavioural contract. Governance aspects that are absent from many other collaborative procurement forms include the enforcement of a mutual respect clause in the PAA through a dispute and issues escalation policy that clearly identifies escalation steps when issues can be resolved at any one level. This is an important measure which is shared by partnering but when combined with the sink-and-swim-together culture it adds another important layer to the effectiveness of consensus decision making. PAA governance is design to reinforce the links between incentivisation, contractual performance and behavioural performance measures so that it becomes a unique procurement design to achieve consensus, create a no-blame culture and therefore redirect resources away from defensive routines to more constructive action.

No-blame in Practice – Illustration from a PA Case Study

This section draws upon data gathered on a recently completed PA in Melbourne that is indicative of the process of no-blame that generally occurs across all project alliances that we have studied. The following figures were provided by the AM from the recently completed AUD$135.8 million 45 month redevelopment of the existing Hamer Hall project. Figure 2 illustrates the business-as-usual case in traditional projects where each participant looks after their own interest as their first priority.

Figure 2 begins with a problem being identified, typically an interface problem where there is no guidance on which project participant was responsible for temporary work that is clearly needed to maintain schedule. Aconex is the electronic groupware communication platform used on the project. It is clear who is best placed to undertake this interface work but contract documents are ambiguous about who is responsible and somebody should be instructed to proceed with that action. Other typical examples may pertain to conformance to conflicting standards, legal requirements, local authority interpretations and an array of ambiguous resolution of coordination and compliance issues. Many other situations trigger such an event. Figure 2 clearly illustrates a trail of potential blame-shifting and inaction. This can be contrasted with Figure 3 which illustrates the same process following a potential problem being identified in a PA.

Figure 3 begins in the same way as Figure 2 except that the relevant team members are assembled to assess and make a judgement about the identified problem. This *ad hoc* team would comprise those that the governance system would require to take action so that authority to proceed and conversations about liability, accountability and responsibility can be dealt with together against the backdrop of the "incentivisation" and behavioural leg of the PAA. Because it is in the interest of all parties to resolve the issue quickly and pragmatically, and because the best-for-project behaviour is linked to potential pain/gain sharing a totally different dynamic is enacted to that portrayed in Figure 2. Additionally, the *ad hoc* team can thus create new knowledge about the context that triggered the problem through a more thorough and wide reaching investigation of potential cause

Trust is designed into the approach through self-interested trust and PAA terms as well as through socially oriented trust embedded in both the PAA and the PA work practices.

and effect loops and other symptoms and causes. This is achieved by looking at the 'problem' with the broad expertise of the *ad hoc* team and considering potential opportunities triggered by the crisis event. The focus that is applied because of the governance system (the way that teams are designed to behave towards each other, the contractual arrangements and the ambience of the PA) dismisses issues of blame from the conversation and instead introduces an action learning process to both resolve the issue and to imbibe and absorb learning from this learning event exercise.

In this way a strategy to resolve the problem is developed, this is confirmed and documented through the document sharing system for later access as a potential 'lesson learned' and the action is processed with monitoring, adjustment and further documenting of the action and how the process worked. The problem is thus resolved. More importantly perhaps is the intangible value created through this illustration of the process. This can be summarised for successful problem solving as:

1. The problem is more effectively and efficiently resolved;
2. Relationships are generally enhanced and reinforced through collaborative problem-solving that increases absorptive capacity and generates new knowledge about the project context;
3. The value of collaboration and knowledge sharing is enhanced and so the perceived value of each participant in the *ad hoc* team and what they offer in terms of knowledge, skills, experience and social capital is enhanced;
4. The project context becomes better understood and appreciated and so it becomes a richer context in terms of knowledge transfer, often team members learn something new from exposure to solving the problem;
5. The process is documented to make explicit previous tacit knowledge and to embed that through productive socialisation, theories are tested by experimentation; and
6. A potential innovation may have resulted out of this process to be leveraged throughout the project.

Discussion and Conclusions

The PA agreement is critical to a no-blame culture in that it stipulates the way in which the PO and NOPs will interaction collaboratively in addressing the frequent and inevitable problems that arise from uncertainty in planning and delivery of projects. It specifically requires collaboration and consensus for team members to pro-actively address difficult problems and it establishes a governance framework through the PAA for fair payment of work undertaken, collaborative engagement on problem solving and a pain/gain sharing formulae to incentivise the world view and actions of participants based upon the overall project performance as stipulated by agreed and clear KPIs. Trust is designed into the approach through self-interested trust and PAA terms as well as through socially oriented trust embedded in both the PAA and the PA work practices. This approach uses the PAA to effectively negate any tendency to blame so that a full repertoire of options to solve problems as they arise. This often leads to innovative approaches being adopted. We illustrated how a typical problem arising out of project work is handled in Figure 2 and 3.

Figure 1 illustrates the characteristics of the no-blame culture that is designed and delivered through the PAA commercial, behavioural and incentivisation elements. In this way we demonstrate critical conditions that facilitate a no-blame culture and we illustrate how it is enacted.

We stress the importance of several measures needed to be in place to facilitate a no-blame culture:

1. A project agreement that is specific about intentions and requirements for collaboration;
2. 'Teeth' to the PAA agreement in the form of a behavioural contract segment that specifies behavioural expectations and requirements linked to behavioural KPIs that in turn are linked to a pain/gain share formulation;
3. Open and transparent participant interaction that facilitates teams to gain access to and understand a multi-perspective view issues and proposed resolutions so that a richer repertoire of solutions can be openly explored.

This paper scratches the surface of the mechanisms that are in place with PAAs to facilitate a no-blame culture. Other relationship-based procurement forms may offer similar opportunities.

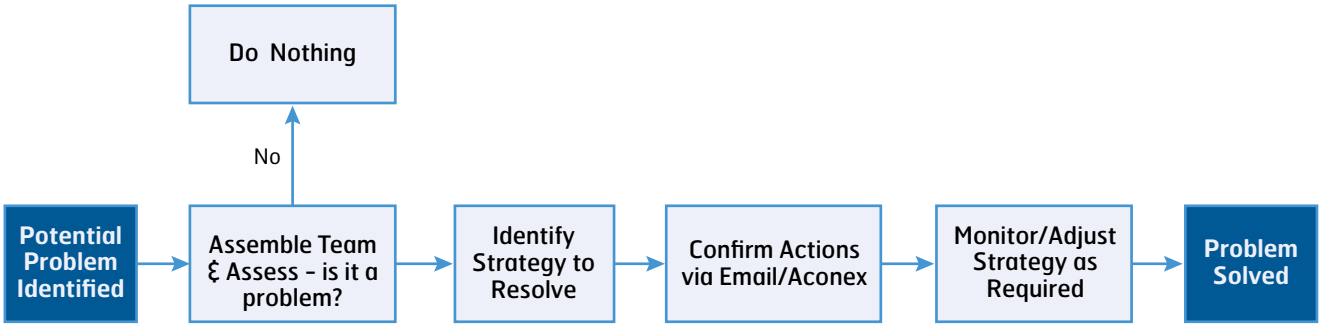

Figure 3. Typical Project Alliance Problem Solving Model (Pitman, 2012)

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Decision Making to Purchase Family Homes:

Feng Shui versus Sustainability

Purchasing a family home is the most important decision to make. Feng Shui is an important element to be considered in purchasing real estate property for many Chinese families. The concepts of Feng Shui has been gradually adopted and accepted in the western world. It has been found that, in many perspectives, there are similarities between the concepts of traditional Chinese Feng Shui where harmony between environment, buildings and people are created; and western style of sustainability that focuses the harmonious relationship between human and nature. This paper reviews the Feng Shui elements considered by Chinese families and explores the main features considered by the Western families when purchasing a home. Through case studies in Sydney, the findings will be compared and the elements that are similar or different will be discussed.

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Introduction

The purchase of real property for most families is a big decision because of the large amount of capital investment outlay and continual commitments to a mortgage. In addition to the finance, Feng Shui is an important element to be considered in purchasing real property for many Chinese families. Many Chinese families may be willing to spend a little bit more on a property if the property has *good Feng Shui*. On the other hand, if a property is priced competitively cheaper and affordable but may have *bad Feng Shui* elements, many Chinese families may decide not to buy the property. Why does Feng Shui matters?

The term Feng Shui is an ancient art and science for harmonious of the built and natural environment developed over 3,000 years ago in China. The word Feng Shui can be translated literally as "wind-water" in English. Wind and Water are associated with good environment and health in Chinese culture (Lip, 1979). It was first taught in the classic text The Book of Burial published in the Jin Dynasty (276 - 420) (Mak and So, 2011). Feng Shui is a complex body of knowledge that reveals how to balance the energies of any given space to assure the health and good fortune for people inhabiting it (Tchi, 2012).

In many perspectives, there are similarities between the concepts of traditional Chinese Feng Shui where a harmony between environment, buildings and people are created; and western style of sustainability that focuses the harmonious relationship between human and nature (Dong and Zuehl, 2009). In the Western culture, families tend to buy houses that contain features such as close to water, quieter street, nice neighbourhood, bright rooms and so on. In Australia, north facing houses are much more preferable by most buyers. Other factors like air circulation, energy efficiency and safety are the main concerns implied at building design process in the Western world (Mak and Ge, 2010).

This paper studies the Feng Shui elements considered by Chinese families and explores the main features considered by the Western families when purchasing a home. The study is considered significant as the findings can be a guide for designing the exteriors and interiors when developing properties. It can be also serve as a reference for town planning in the built environment contexts. The paper is first to review the Feng Shui concepts, the Form School model. Feng Shui design criteria and their implications on property purchases will also be discussed. Second,

a desktop survey on features expected by the Westerners in their home purchases will be reviewed. The Feng Shui concepts and Western family's views and expectations in purchasing a property will be compared through a case study. Conclusion and implications will be drawn last.

Feng Shui Concepts

Feng Shui is about the interaction of humans and their environments, i.e., creates harmony between heaven, earth and human (Mak and So, 2011). One of the most basic principles is unity between heaven and human, i.e., brings harmony between the universe, earth and human energy. The energy is valued in both the physical and the invisible form knows as "*Qi*" (or "*Chi*", natural energy or breath of life) in the traditional Chinese Feng Shui culture. Skinner (1982) suggested that Feng Shui designs aims at a balance and harmonious environments that can produce an ample amount of good *Qi* (positive energy) and filter out the bad *Qi* (negative energy). This is one of the reasons why Chinese families look for good Feng Shui properties to attract "positive energy".

The second concept is the Five Elements Cycles, which are fire, water, metal, wood and earth. Its theory is that everything in the universe has an attribute according to these five elemental groups of substances. The relationships of the five elements consist of productive and destructive cycles (Walters, 1989).

Yin and Yang harmony is the third Feng Shui principle. Yin represents the passive principles in nature exhibited as darkness, cold and wetness. Also the moon, femininity and passive, the realm of the dead and tombs are represented Yin. Yang represents the active principles in nature exhibited by light, heat and dryness. Also sun, masculinity and active, the realm of the living, building, towns, and cities are symbolized Yang. Yin and Yang are the two opposing parts but have a complementary relationship. A good Feng Shui means that Yin and Yang are balanced and harmonious within a space, designed to create balance in the users' life when engaging in the space (Feuchtwang, 1974).

The *Form School* relates to physical configurations of landscape design and urban planning, and the *Compass School* focus to time, space and orientation are the two main Feng Shui Schools (Xu, 2003). The most prominent approach to the built environment and building design follows the principles and practice of the Form School (Lip, 1986; Xu, 1990; and Too, 1996), which is primarily based on the verification of the physical configuration of mountains and watercourses surrounding sites and buildings (Mak and So, 2011). The Form School consists of "Five Geographical Secrets", namely dragon, sand, water, cave and direction (Lip, 1979). The combination of these five Feng Shui geographical elements and the four emblems (green dragon, white tiger, black tortoise and red phoenix as the four cardinal directions) produced the classic Feng Shui model. Figure 1 shows the Form School model that examines shapes and symbolism in the environment which can be applied to a property.

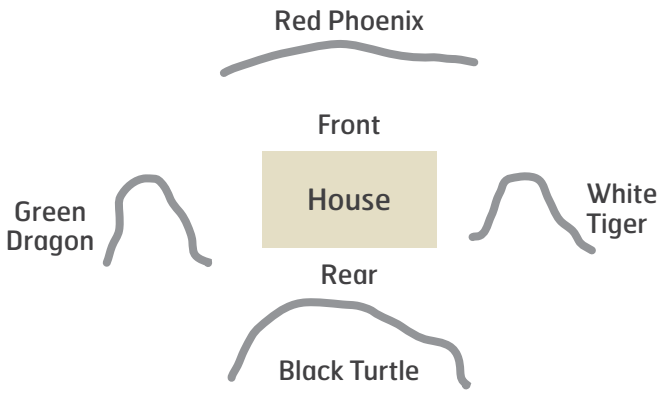

Figure 1. Form School Model (Feng Shui Store, 2012)

A principle of balance between interior and exterior spaces is an important principle that describes the site conditions and the design of buildings. The location of the site, conditions that surround the site, topographical conditions and the shape of the site are called the Outer Form. The Inner Form consists of the layout of the building, elevations of the building, and elements of building (Lee, 1986). Cheng and Kong (1993) provided a further classification of space into four design modules: surrounding environment, external layout, internal layout and interior arrangement.

The principles of *Form School* Feng Shui can be applied to houses that are located in cities or suburban areas in term of surrounding environment, external layout, internal layout and interior arrangement. Table 1 shows the key elements of *Form School* Feng Shui for a building.

Contemporary Design Principles

Traditionally, bioclimatic design approach is the common approach applied in the Western design world. The approach applies a logical sequence of analysis and constructs appropriate strategies to minimise the external impacts and rational use of resources (Olgyay, 1963). The bioclimatic design strategies aim to take advantage of the favourable environmental aspects, while avoiding or moderating the unfavourable impacts through appropriate design decisions. Axarli and Teli (2008) implemented of bioclimatic principles in the design of urban open spaces to improve human comfort which includes thermal, visual, acoustic comfort and improvement of building's energy behaviour and air quality.

More recently, the concept of sustainability has brought into the design principles in the built environment contexts. The elements of sustainable design includes many areas such as waste and recycling, energy, water, building design, emission,

Organisational Factors			
Surrounding Environment	**External Layout**	**Internal Layout**	**Interior Arrangement**
Topography	Shape of Site	Layout	Door Openings
Front of Site	Entrance	Doors	Bedroom
Rear of Site	Shape of Building	Windows	Kitchen
Sides of Site	Orientation	Shape of Rooms	Living Room
Street Location	Trees	Staircase	Bathroom
Water View	Pond	Ceiling	
Wind Direction			

Table 1. Key Elements of Form School Feng Shui (Mak and So, 2011)

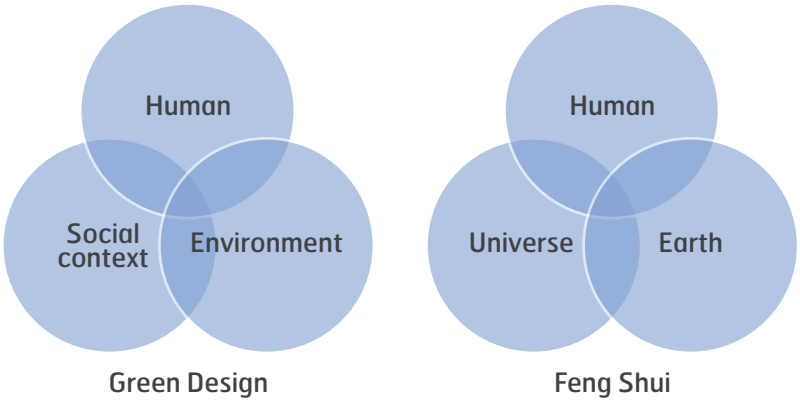

Figure 2. Comparison between Constructivism and Feng Shui concepts (Dong and Zuehl, 2009)

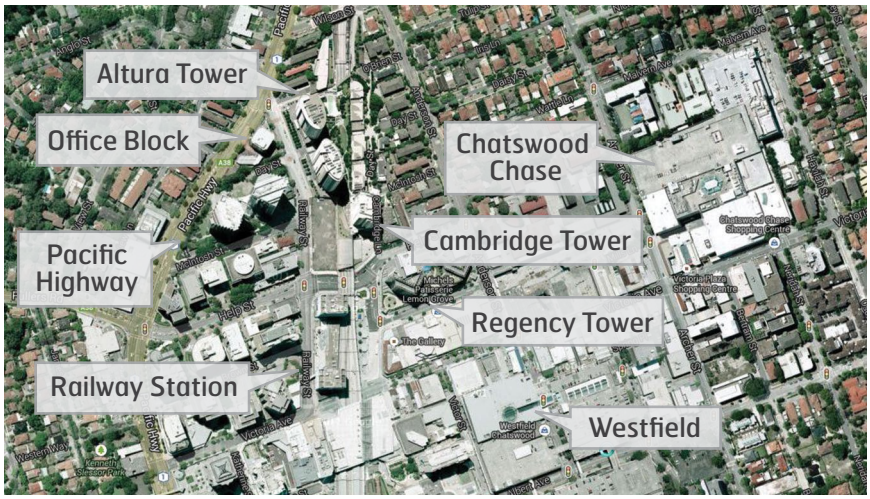

Figure 3. The Chatswood Built Environment (Google Maps, 2012)

A three bedrooms and two bathrooms unit at 15-floor, 2A Help Street, Chatswood - Regency Tower.		The unit faces the South East and revels in breathtaking panoramic views stretching all the way to the Pacific Ocean and taking in glimpses of the city skyline. Total 178 square meters.
A two bedrooms and two bathrooms unit at level 8, 11 Railway Street, Chatswood – Altura Tower.		The unit is located on the North West corner of the building with 119 square meters including balcony, the bedrooms are separated by the living area which creates excellent space and privacy within the unit.
A three bedrooms and two bathrooms unit at 21-floor, 1 Cambridge Lane Chatswood – Cambridge Tower.		North-west facing, 3 bedrooms with ensuite with panoramic distance views, capturing the northern sunlight.

Table 3. Brief description of the three selected case studies in Chatswood

indoor environmental quality (IEQ), alternative transport, landscaping, and about everything that do affects everything around human, aims to eliminate negative environmental impact and maintain ecologically sustainable completely through skilful and sensitive design (McLennan, 2004). Dong and Zuehl (2009) recognized that there is a set of five fundamental concepts for sustainable development. They are constructivism, circular design, energy efficiency, balance between natural and the built environment, and thinking global and buying local.

Chinese Feng Shui and the Western design principles are similarities in term of that both systems target human wellbeing. The concept of constructivism translates well into the principles of harmony between universe, earth and human in Feng Shui. The ideal environment for Feng Shui is when these three aspects intersect and overlap. These three circles can be found in sustainable design as social contexts, environment and human as shown in Figure 2.

The principle of Feng Shui is the productive and destructive cycles of five elements, which is similar to the circular design concept. The concept is the balance and harmony between Yin and Yang, which also matches with the concept of sustainable design of balancing between natural environment and the built environment. The Feng Shui concept of balance between interior and exterior spaces focuses on the physical form and spatial arrangement of the built environment coincides with the energy efficiency and buying local concepts that explicitly emphasise on the sources and consumptions of natural resources.

The difference between Feng Shui and the Contemporary models can be identified in term of research and analysis methods, analysis structure and criteria. Xu (2003) summarized their differences presented in the Table 2.

	Research Methods	Analysis Methods	Analysis Structure	Analysis Criteria
Bioclimatic Model	Climatic factors: temperature, humidity, wind, etc.	Individual analysis and their correlation effects psychometric chart, and comfort zone	Frame structure	Human comfort
Sustainable Design Models	Nature process: geology, physiography, hydrology, climate, vegetation, energy efficiency etc.	Identify values for different categories and select a better fit environment and adaption	Layer structure	Fitting environment for development
Feng Shui	Qi and its relation with environment	Survey the mountain and water, find suitable area and arrange Qi	From big system to small sub-system	Living Qi should be abundant and harmonious with the surrounding

Table 2. Comparisons of Feng Shui and the Contemporary Models (Xu, 2003)

Case Study and Discussions

Three residential units are selected as case studies for analysis different views in home purchase decisions using the Fend Shui concepts and the contemporary models. The cases are located at Chatswood New South Wales Australia. The locations of these three selected units are listed in Table 3.

The External Environment

Chatswood is a suburb in the state of New South Wales, Australia, 10 kilometres north of the Sydney central business district. It is a major commercial and retail districts in the North Shore. In the 2011 Australian census, the total population of Chatswood was 21,194 people. There are two main shopping centres (Westfield and Chatswood Chase) and retail shops are nearby. The Chatswood railway station is on the North Shore Line and the Northern Line of the Cityrail network. The three selected units are located around 200 – 450 meters from the Chatswood railway station. The Altura Tower is located at the western side of the rail, while Cambridge Tower and Regency Tower are located at the eastern side of the rail line. Figure 3 depicts the relationship of these three buildings and their environment.

The Internal Environment

Most of the information and photos provided by the real estate agents and recorded in the RP Data database contain positive perspectives of the properties. However, when each unit was investigated in details, negative elements were found in all three case studies.

The principle of Feng Shui is the productive and destructive cycles of five elements, which is similar to the circular design concept.

Figure 4. Positive elements of the Regency unit (RP Data, 2012)

The positive elements of the Regency unit are (Figure 4):

- Distance panoramic views to Pacific Ocean (Bioclimatic model) that brings positive energy (Good Feng Shui) and summer breeze from the ocean (Sustainable Design model)
- Open-plan floor layout and bright rooms with a lot of natural light (Sustainable Design model)

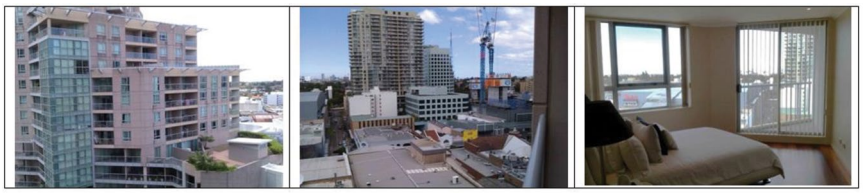

Figure 5. Negative elements of the Regency unit (Source: the Authors)

The negative elements of the Regency unit are (Figure 5):

- South-East facing (Bioclimatic model) will result hot in summer morning and no Northern sunshine in winter (Sustainable model)
- Overlook the Tower B of Regency and distance view blocked (Bad Feng Shui)
- Overlook the roof of Westfield shopping centre and constant noise from cooling towers of Westfield shopping centre that brings negative energy (Bad Feng Shui)
- Irregular shape of bedrooms (Bad Feng Shui)

Figure 6. Positive elements of the Altura unit (RP Data, 2012)

The positive elements of the Altura unit are (Figure 6):

- Balcony with distance views from North-East side (Bioclimatic model) that brings morning sun and summer breeze (Sustainable Design model), as well as street view (Good Feng Shui)
- Open-plan layout, bright kitchen and breakfast area with a lot of natural light (Sustainable Design model)

Figure 7. Negative elements of the Altura unit (Source: the Authors)

The negative elements of the Altura unit are (Figure 7):

- The windows and balcony face a high-rise office building tower with large signage/logo on the opposite side thus Northern views are blocked (Bioclimatic model) that creates negative energy (Bad Feng Shui)
- Constant noise from the main road Pacific Highway (Sustainable Design model)
- The unit's main entrance facing the building's lift door opening (Bad Feng Shui) that brings negative energy (Bad Feng Shui)

Figure 8. Positive elements of the Cambridge unit (RP Data, 2012)

The positive elements of the Cambridge unit are (Figure 8):

- Panoramic views to North direction (Bioclimatic model) that brings positive energy (Good Feng Shui) and large open-plan space with north facing balcony bring Northern sunshine in winter (Sustainable Design model)
- Separate kitchen and breakfast area (Sustainable Design model)
- The bedrooms are separated from the living room (Good Feng Shui)

Figure 9. Negative elements of the Cambridge unit (Source: the Authors)

The negative elements of the Cambridge unit are (Figure 9):

- Construction site outside Western windows (Bioclimatic model)
- Direct line of sight incoming and outgoing trains to railway station from the balcony (Sustainable Design model) that brings negative energy (Bad Feng Shui)
- Mirrors on both opposite sides of wall create "ghost" effect of multiple reflections (Bad Feng Shui)

Analysis and Comparison

The key positive and negative elements of these three case studies are analysed and compared with the bioclimatic model, sustainable design model and the Feng Shui model (Table 4).

Based on the bioclimatic model, the three case studies are first compared according to the climatic factors, mainly directions and orientations in urban context. Secondary, based on the sustainable design model, three case studies are then analysed on the interaction with the natural environment, such as sunshine, wind direction, noise, etc. Finally, based on the Feng Shui model, these three case studies were analysed incorporating the holistic view of invisible energy between the built and natural environment. This process of analysis from bioclimatic model, sustainable design model to Feng Shui model is transited from tangible factors to intangible factors.

Conclusion

Traditional Chinese Feng Shui has been adopted, accepted and applied by the Western world in the built environment contexts. The principles of both the Feng Shui and the Contemporary models are similar in term of targeting human wellbeing and study the relationships between human and the built environment, though the analysis method, structure and criteria of the western and eastern principles are different. The distinct feature of western sustainable design has more emphasis on measurement of physical attributes such as efficiency of water and energy consumptions; whereas Feng Shui emphases are on balance of Yin and Yang, exterior and interior, the relationship between human and surrounding environment. The application of Feng Shui knowledge has been embraced by the western concept of sustainability for decision marking to purchase family homes.

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	Regency Unit	Altura Unit	Cambridge Unit
Bioclimatic Model	**Positive:** Panoramic views to the Pacific Ocean **Negative:** South-East facing	**Positive:** Some distance views from North-East side of the balcony **Negative:** Northern view blocked by a high-rise office building	**Positive:** Panoramic views to North direction **Negative:** Close to Construction site
Sustainable Design Models	**Positive:** Bring Summer breeze from the ocean **Negative:** South-East facing, hot in Summer morning, but no Northern sunshine in winter	**Positive:** North-East direction bring morning sun and summer breeze **Negative:** Blocked Northern view, outside traffic noise, and internal traffic noise with entrance facing lift door opening	**Positive:** North facing windows and balcony bring Northern sunshine in winter **Negative:** Direct line of sight of incoming and outgoing trains to railway station from the balcony
Feng Shui	**Positive:** Distance view to ocean that brings positive energy. **Negative:** Views blocked by other high-rise buildings and constant noisy surrounding environment from roof-top machinery of Westfield shopping centre that brings negative energy.	**Positive:** North facing street view. **Negative:** Front view blocked by a high-rise commercial building with large sign/logo, noisy road intersection with Pacific Highway, noisy internal traffic when entrance facing lift door opening that brings negative energy.	**Positive:** Distance view to Northern direction brings positive energy. **Negative:** Direct line of sight from the balcony of incoming and outgoing trains to railway station that brings negative energy.

Table 4. Analysis of the Features in Case Study according to Contemporary Design

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Notes:

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