AGILE ANALYSIS: IT ISN'T OPTIONAL

Introduction

Project Strategy is the overall gameplan for delivering the project. It is a "top-down" structure within which iterative and ongoing tactical planning and task management will be carried out.

Whilst "projects move through a number of development phases, steps or tasks (often called methodologies)...[t]he project development strategy is independent of the particular methodology" (Thomsett, 2002). Equally, whilst requirements are packaged and delivered through the selected Strategy, the IT Architecture is independent of the Strategy as well.

While the concept of project Strategy had been aired since 1968, since the 1980's Rob Thomsett has highlighted the criticality of public planning and selection of project strategy. Project Strategy must be negotiated, agreed with stakeholders, and documented as part of the Business Case. Selection of Strategy is a key tool for the Project Manager to manage project risk. As well, public agreement on Strategy can reduce "de-scoping" and other degradation of quality. Finally, changing the Strategy in the light of significant change to the project may be an appropriate option for the project manager to manage to the changes: however, care must be taken to ensure that the Strategy is not merely abandoned., but changed only to reflect changes in the overall expectations.

Thomsett (2002) suggests that there are three key factors guiding selection of project Strategy: team size, length of time, and risk profile. Whilst team size and length of time available are constraints that are relatively straightforward to understand, the risk profile is made up of a series of factors including requirements. This paper discusses the impact that various profiles of requirements will have on selection of project Strategy.

ABN: 97 081 830 499

GPO Box 2785
Canberra ACT 2601

fax: +61 3 6257 2081
www.blackcircle.com.au

Methods

A series of projects of varying sizes conducted over 2 decades were qualitatively analysed to determine the Strategies most effective or suited to managing requirements with various risk profiles. Fourteen projects from six sites were selected for inclusion on the basis that:

a) they were broadly similar in that they had a business and transaction focus;

b) business requirements were a significant aspect of the project; and

c) where they proceeded to implementation they had broadly similar technical platforms (generally with significant use of 4GL languages).

The following steps were then followed:

Firstly, the Strategies used were reviewed and the Strategy model was slightly modified from that presented by (Thomsett 2002) to that outlined below and illustrated by Figures 1-4.

The simplest model for projects moves through a development lifecycle in a single pass, with the outputs from each activity finished before commencing the next activity. This Monolithic or Waterfall model is shown at *Figure 1*. There is a second model unit, the Fastrack, shown at *Figure 2*, which permits later activities to be started prior to completion of the earlier activity. Neither model permits prior activities to be re-started.

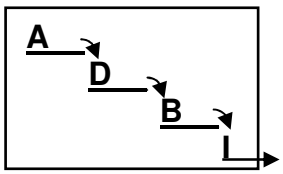

Figure 1: The Monolithic Delivery Unit

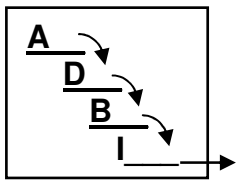

Figure 2: The Fasttrack Delivery Unit

Whilst these base units may be used as Strategies in their own right, for a project with any size or complexity more sophisticated Strategies are needed: Sequencing of base units into a Sequential or Release Strategy, and Parallel or Concurrent Strategy are two basic patterns. Typically, a hybrid of Parallel and Sequential structures is used, as illustrated at *Figure 3*. This allows mixing and matching

of base units to give the level of control needed with minimum overheads. Each module uses the outputs from the previous one as inputs. Each therefore reviews and re-validates them for current accuracy before developing them further: change can thus be incorporated dynamically.

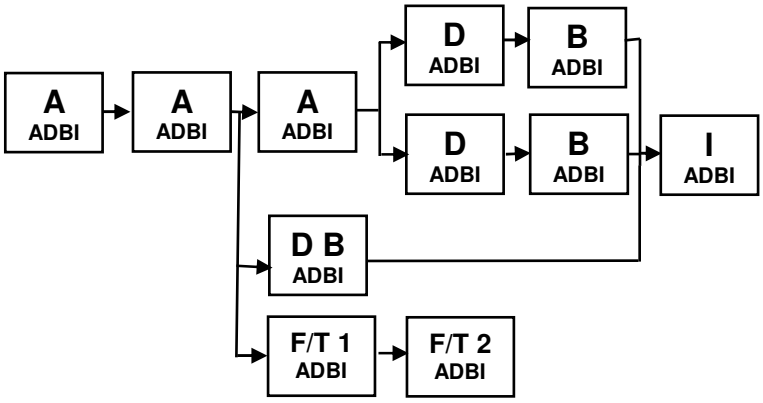

Figure 3: A Hybrid Strategy

There is a second variant on the Parallel Strategy, illustrated at Figure 4, which sets up multiple tracks in parallel and incorporates decision points at which tracks may be abandoned or activated. The clearly defined decision points signal key project planning points, as no detailed planning would be undertaken for post-decision activities. This has been dubbed the Switching Strategy.

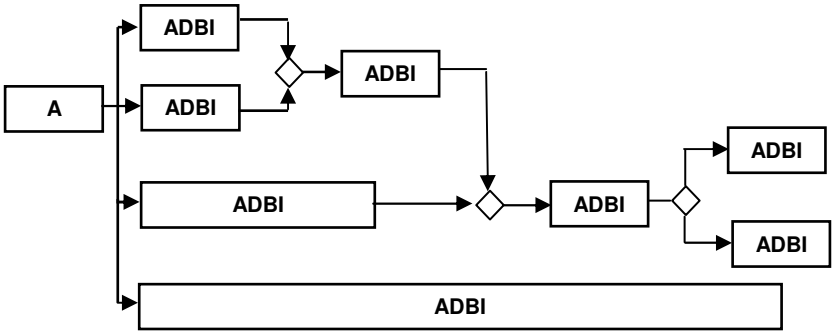

Figure 4: A Switching Strategy

Requirements Categories

Secondly, recognising that "vague requirements" and "unclear requirements" can manifest in many ways, a requirements profile descriptor was developed to succinctly describe the essential characteristics of the requirements profiles encountered. Eight descriptors are used:

Complex: feedback loops between elements of the activity

Complicated: busy activities with lots of steps and lots of nodes on the diagrams, but no feedback loops between the nodes

New: requirements new to the organisation or team undertaking the project, but for which there may be relevant models and examples in the industry

Novel: genuinely new requirements, with little or no suitable models or examples in the industry, and possibly requiring some technological or even scientific research.

Undefined: that is, unknown because the analysis has not yet defined them

Unscoped: scope is unclear and there is uncertainty around whether to define the requirements.

Volatile: requirements may be defined or not, agreed or not, but known to be subject to change over the life of the project

Simple: not meeting any of the previous seven profiles

Project Characteristics

Thirdly, the projects were then categorised and analysed by: size, length of time, team size, risk, approach, success, strategy used, requirements profile.

- The projects range in length from 1 month to 3 years,
- The overall effort ranged from 1 to 350 person-months.
- 7 (50%) were medium risk, 6 (36%) were high risk, and 2 (14%) were low risk.

As shown at *Figure 5*, all of the Requirements Profiles were represented, with some of the larger projects exhibiting aspects of more than one profile.

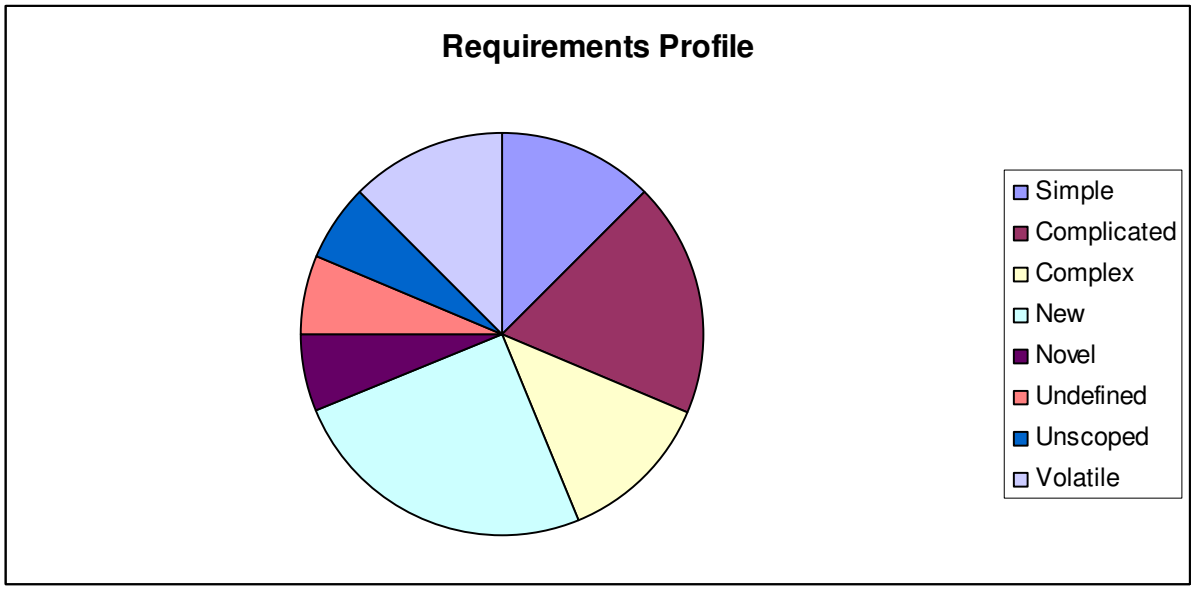

Figure 5: Projects exhibiting each Requirements Profile.

As shown in *Figure 6*, all of the Strategies were represented

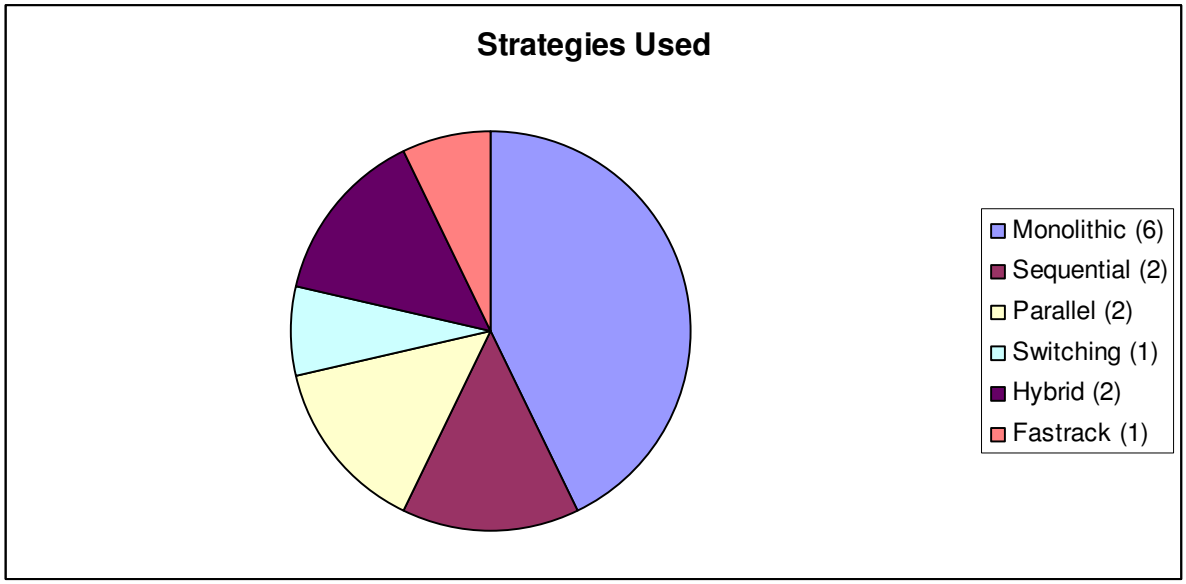

Figure 6: Numbers of projects using each Strategy

Finally, specific Project Strategies were hypothesised as being appropriate for the various requirements profiles, and tested against the project data.

Results

Table 1 documents the success of the various projects by profile and by strategy used.

Strategy / Profile	Monolithic	Fastrack	Sequential	Parallel	Hybrid	Switching
Complex	No				Yes	
Complicated				Yes	Yes	
New	Yes	Yes	No	Yes		
Novel					Yes	
Undefined	———— Not applicable ————					
Unscoped	No					
Volatile						Yes
Simple	Yes		Yes			

Table 1: Strategies to meet various Requirements Profiles

1: It is possible to predict successful Strategies for various Profiles.

Firstly, it is possible to predict successful Strategies for various requirements profiles.

Complex requirements are difficult to model accurately, impossible to test rigorously. The feedback loops must be unravelled, understood and eliminated in the proposed model. Project 3 failed to do this, and this second implementation of the requirements was a failure (as was the first). Complex requirements must be separated from merely complicated areas, and be allocated to separate modules within a Hybrid delivery. This approach was successful in project 6. Project 7 was not successful until this separation was undertaken.

Complicated requirements are appropriately managed by isolating areas of complication into different dimensions, and then partitioning appropriately within a Parallel or Hybrid strategy. This was successful in all 4 projects examples (Projects 6, 10, 11, 12).

For New requirements that are unknown simply because this has not been done here before (eg: the first time an intranet was implemented in any specific organisation) a valuable option may be to use a small number of Scenarios to get started on the initial rough requirements as quickly as possible and to feed this into the Fast-track model to deliver something rapidly and to test it live as quickly as possible. After a few iterations of this cycle, the requirements will become clear, and it will be feasible to do the final iteration, which is a structured delivery to stabilise the situation. This was successful in Project 14.

For new requirements for which there are some obvious models (eg: other existing activities or products) a Parallel Strategy (or a Monolithic Strategy for small tasks) will be lower risk and may be highly effective. This was successful in three other projects (Projects 2, 4 and 8)

Novelty Where requirements are unclear because the proposal is genuinely novel (eg: initial cellphone technology), research elements will need to be separately boxed into modules managed by a scientific or technological research methodology. For the requirements that are unknown simply because this has not been done before (eg: the first mobile phone interface design), an appropriate approach is to use a Fastrack unit and to treat them as New requirements, as outlined above. Accordingly, the overall strategy will be a Hybrid delivery. The Novel elements of Project 6 were handled successfully in this way)

Unknown scope and consequent lack of clarity of requirements must be resolved by resolving the scope. If elements of the scope are not amenable to resolution then the situation is best treated as a risk and reported as such. Project 1 was distinguished by having both areas of undefined scope and also areas where the requirements were New but Undefined. The risk was reported and eventually the project was abandoned.

Volatility is best managed with a Switching Strategy with detailed project planning delayed until after decisions are made or changes have had time to settle. The Switching Strategy should be supported by a flexible model of the activity. This flexibility implies that significant normalisation of data and decomposition of function must be undertaken to provide the necessary flexibility of underlying data and process. The Switching Strategy was used successfully in Project 9, where quality was paramount, the schedule fixed, and the requirements would not be agreed until the closing weeks of the Project. The Strategy was to start work on all the likely scenarios a year ahead and to switch them off one by one as various specific scenarios were eliminated. By the the closing weeks all the team were working on the single agreed scenario, which was delivered on schedule and with a record low rate of defects.

2: Partitioning the Requirements (that is, grouping requirements within modules of the selected Strategy) requires consideration

Secondly, partitioning the requirements (that is, connecting or grouping requirements within modules of the selected Strategy) requires consideration and planning. (Thomsett 2002) proposes three options:

Individual requirements may be linked together for delivery to meet several needs: Particularly for projects with high ICT usage, high cohesion of function or process is desirable, with little or no coupling of the associated data as measured by interfaces. Pragmatically it is often the persistent data that provides the desired linkage: thus, data provided by one objective may be critical for another function. There is a real risk of introducing business problems into the live environment under this scenario, and this risk must be identified and managed. Project 12 supports this. It was straightforward to implement technically, but introduced complication into the business environment, where manual processes, personal spreadsheets, and ad-hoc workarounds were all introduced to substitute for requirements missing from the initial releases.

Partitioning may be planned to maximise the benefits stream. That is, requirements delivering significant benefits are allocated to modules scheduled for early delivery, to maximise the chance of delivery and receipt of benefits. This can be measured quantitatively, which may assist in building stakeholder support for the partitioning plan. Unfortunately, none of the projects selected for inclusion were partitioned on this basis.

Partitioning may also be planned around stakeholder preference. This is a qualitative criterion, and the evidence from the project data suggests that it is not an effective choice. One large project in particular used stakeholder preference to partition the project across several releases: one stakeholder completely marginalised the two other sponsoring bodies, and these two bodies incurred costs and reduced benefit streams as a result.

In addition to these three options, staff or system resources to be saved by one objective may be required to enable another objective to occur without disrupting the work environment. Connecting these requirements into a single implementation will assist in minimising the impact on people's jobs, and on gaining acceptance for the new product or activity.

3: The Requirements Profile assists in consideration of Sequencing into the later modules of a Sequential or Hybrid delivery

Thirdly, the requirements profile assists in consideration of Sequencing into the later modules of a Parallel or Hybrid delivery

Some requirements may be dependent on other objectives that are to be delivered earlier in the project. Obviously, these requirements must be sequenced and scheduled later rather than earlier.

The most volatile requirements may go into later modules, because given enough time they may settle down. This was done successfully with Project 6. Paradoxically, the most stable requirements may also go in later modules, because they are unlikely to change, and so attention can be given up-front to managing more risky considerations. This was done successfully in Project 12

The requirements delivering objectives with low benefit streams may be sequenced into later modules, because they will have least effect on the overall benefits stream. As noted above, none of the projects selected for inclusion were partitioned or sequenced on this basis.

4: The Requirements Profile and consequent selection of Strategy can assist to deliver Expectations within project Constraints

Fourthly, the requirements profile and consequent selection of Strategy can assist to deliver Expectations within project Constraints

When the requirements must be complete, there are two key scenarios. If requirements are low risk, then consider Parallel delivery, as it gives a shorter timeline over which deliver them, and therefore less chance of "de-scoping". This approach was taken successfully in Project 11. In the event that the requirements are unknown or otherwise high risk, then consider the Fasttrack Strategy. This will avoid analysis-paralysis by getting something out there quickly, and then reworking it until the requirements are finalised. However, in the short term quality may be low, and this may introduce further risk to the project. In Project 6 this risk was managed successfully and the Fastrack Strategy was used effectively to develop the platform needed to introduce a then new model for auctioning based on games theory research.

When quality is paramount, the Sequential and Monolithic Strategies will give the cleanest environment with lowest risk of introduced errors. However, consider a Sequential model with short modules rather than Monolithic, because the Sequential model also gives the opportunity to review and rework earlier deliveries if necessary. In the available data Project 9 overrides this with a Switching Strategy to manage the risk to quality associated with Volatile requirements, and no other examples are relevant to this scenario. The project with the highest initial defect rate was Project 6, which did not use a Sequential or Monolithic Strategy, but used a Hybrid Strategy.

When there is little room to move on budget, consider Monolithic and Sequential models, as these have the lowest management and communication overheads and subsequently lower costs. They also have a lower likelihood of extra cost being incurred to rework errors. It is interesting to speculate that this is occurring unconsciously: there was a tendency for projects to be up to 2 person-years, and to therefore to be managed using a Monolithic Strategy, almost by default.

When meeting a specified time is critical for project success and the time specified is very short, consider using a Fast-track Strategy to assist analysis of requirements rapidly enough to meet a short time-line. However, the price is a complete subsequent rework of the deliverables to stabilise them. This approach was used successfully in Project 14.

Conclusion

Team Size and Project length are useful indicators of industry practice: there was a strong tendency (78%) for projects to be up to 2 person-years, and for these to be managed using a Monolithic Strategy (54% of the 2 person-year group, and 42% of all projects included). This was correlated with success when the requirements profile was New or Simple, such as in Projects 4, 5 and 13). However, as the requirements profile moved into the higher risk categories of Complex and Undefined, failure was likely, regardless of size. This suggests that risk may be the strongest of the three indicators of selection of Strategy.

While the small sample used limits the conclusions that may be drawn, it does support the hypothesis that the analyst has information about risks associated with requirements that is significant in selecting the appropriate Project Strategy within which to undertake iterative and ongoing project planning.

References

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