MN6913 RESEARCH PAPER

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Title of Research:
Requirements Management in Irish IT small and micro-sized enterprises: Can the Value Management Approach provide a foundation for a Project Management Micro-Lite Approach?

Name of Author:
John Edward Walsh - 8472076

Award:
MSc in Programme and Project Management

Awarding Institute:
University of Limerick

Supervisor:
Mr. John F. Kelly

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1 Introduction

This research is focused on the IT Small and Micro sized Enterprise sector in Ireland. This sector is very significant both socially and economically and utilises significant project management efforts. The main aim of this research is to assess how small and micro sized firms are currently managing requirements with a view to considering the Value Management (VM) approach as a foundation for a micro-lite approach.

Recent research from the Central Statistics Office (2012) reports that Small and Medium Enterprises (SMEs) in Ireland accounted, in 2009, for 99.8% of enterprises in Ireland, 69% of private sector employment, 52% of turnover and 51% of Gross Value Added. Over 185,000 of Ireland’s 190,000 companies (98%) employ less than 50 people (Harrigan and Ramsey 2009).

SMEs account for a significant portion of projects, Turner et al (2012) state that more than 40% of turnover for SMEs is undertaken as projects, and that this increases to more than 60% for SMEs in their first two years of existence. If these figures are extrapolated to the Global Economy one could state that $10 Trillion dollars are spent on SME projects annually.

Based on recent research carried out by Turner et al (2009, 2010, 2012) it is proposed that small and micro sized firms need a micro-lite Project Management method based on having a requirements management core and a focus on people rather than systems.

An initial review of the literature, reviewing SMEs; SMEs and Project Management; Requirements Management and Value Management (VM), suggested that a VM approach may provide a basis for the requirements management core needed for a micro-lite Project Management Method.

Therefore, progress in helping this sector can have a big consequence. Academically, it can provide further insight into how small and micro sized firms manage requirements and provide directions for future research and practically, findings may have a significant influence on the millions of people and thousands of companies which make up this sector.

Besides the potential contribution to a Project Management micro-Lite solution for SMEs, the ‘Value’ elements of this research are in line with recent research directions identified for the Project Management Profession as a whole.

Winter et al (2006) propose five directions for future Project Management Research and Direction 3 suggests a move from Product Creation as a primary focus to Value Creation as a primary focus for the overall focus in the management of projects.

Hanisch and Wald (2011) propose an integrated framework for future Project Management Research and their third dimension – the Goal Dimension - incorporates Value Added as a sub category. They proceed to state that value is “probably the primary reason to execute a project, regardless of the industry considered.”
1.1 Research Objectives
The following objectives have been identified to generate the foundational information required to explore the research question posed:

1. Assess Small and Micro Enterprise Project Management use and needs.
2. Assess the importance of good requirements management in projects.
3. Identify some critical success factors for requirements management.
4. Identify the generalised benefits associated with a VM approach.
5. Assess how Irish IT small and micro enterprises approach and manage requirements for projects they undertake through utilising a semi-structured interview method.
6. Assess if the VM approach could provide a foundation for a Project Management micro-lite approach for Irish IT small and micro enterprises.

1.2 Research Approach

This research paper reviews the literature in line with the stated objectives and utilizes the literature review to establish a current status while also using literature findings to form the basis of the guiding questions being asked of the six participating companies utilizing a qualitative research strategy, through the use of a semi-structured interview approach. The results and findings from the interviews are then analysed and the paper finishes with a set of conclusions and a set of suggested next steps.

Given the significance of the SME sector (economically and socially) and project management needs identified by recent research, I believe that this research question can contribute to ongoing SME research and assist in addressing some current practical problems.
2 Literature Review

The Literature review will address the first four objectives stated for this paper:

1. Assess Small and Micro Enterprise Project Management use and needs.
2. Assess the importance of good requirements management in projects.
3. Identify some critical success factors for requirements management.
4. Identify the generalised benefits associated with a VM approach.

By confirming these objectives the paper will validate the significance of the SME sector, establish that SMEs are different to larger organisations and therefore require a different approach to project management use. This section will also verify the importance of requirements to project success and identify a set of best practices associated with requirements management. Finally, this section will identify the theoretical reasons as to why the VM approach may provide a basis for a project management micro-lite solution for small and micro sized firms.

The information from this section will be utilised to guide and direct the exploratory investigation with the participants in order to address the final two objectives of the paper:

5. Assess how Irish IT small and micro enterprises approach and manage requirements for projects they undertake through utilising a semi-structured interview method.
6. Assess if the VM approach could provide a foundation for a Project Management micro-lite approach for Irish IT small and micro enterprises.

2.1 Small to Medium Enterprises (SMEs)

2.1.1 SME Definition:

Small and Medium Enterprises (SMEs) are defined variously in terms of employment, turnover and asset thresholds. For the purposes of this research the definition as proposed by the European Commission (European Commission, 2005, 2008), which became effective from 1st January 2005 will be used.

This states that enterprises will now qualify as micro-, small- or medium-sized if they fulfil the staff headcount, turnover or balance sheet criteria as outlined in recommendation 2033/361/EC, summarised in the following table.

<table>
<thead>
<tr>
<th>Enterprise Category</th>
<th>Headcount</th>
<th>Turnover (Million €)</th>
<th>Balance Sheet Total (Million €)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medium-sized</td>
<td>&lt;250</td>
<td>≤ 50</td>
<td>Or</td>
</tr>
<tr>
<td>Small</td>
<td>&lt;50</td>
<td>≤ 10</td>
<td>Or</td>
</tr>
<tr>
<td>Micro</td>
<td>&lt;10</td>
<td>≤ 2</td>
<td>Or</td>
</tr>
</tbody>
</table>

*Table 1: SME qualifying criteria (Source: European Commission 2005)*
While this definition is not a perfect fit for the Irish market (‘where over 185,000 of Ireland’s 190,000 companies (98%) employ less than 50 people’ (Harrigan and Ramsey 2009)) it is the definition adopted for this paper.

2.1.2 SME Importance:
SMEs have a significant role as engines of economic and social development (Floyd and McManus 2005). Recent research from the CSO (Central Statistics Office 2012) reports that SMEs in Ireland accounted in 2009 for 99.8% of enterprises in Ireland, 69% of private sector employment, 52% of turnover and 51% of Gross Value Added.

In the European Union (EU), SMEs are economically important with 99.8% of an estimated 19.3 million enterprises defined as SMEs, generating 56% of GDP and employing 70% of private sector workers incorporating approximately 65 million jobs. Again, almost all of these are small enterprises, with 18 million enterprises employing less than ten people and only 35,000 enterprises employing more than 250 people. The average European business provides employment for 4.3 people, including the owner/manager.

Figures show that SMEs account for roughly two thirds (67%) of employment within the EU, with micro enterprises accounting for 29.6%, small enterprises accounting for 20.6% and medium-sized enterprises accounting for 16.8% (Schmiemann 2008).

Gunter Verheugen of the European Commission declared that: “Micro, small and medium enterprises are the engines of the European economy. They are the essential source of jobs, create entrepreneurial spirit and innovation in the EU and are crucial for fostering competitiveness and employment” (European Commission 2005).

Additionally, O’Malley and O’Gorman (2001) highlighted the vital role SMEs play in attracting foreign direct investment into Ireland, through supplying multinationals with the raw materials they require to operate in this jurisdiction.

2.1.3 SMEs are Different:
Small to medium sized enterprises are not a scaled down version of larger firms (Man et al 2002). These types of organisations differ from each other in terms of organizational structures, responses to the environment and the managerial styles which are employed.

Where available, the literature exhibits a research bias towards larger organisations and the methodologies and techniques employed for larger organisational research are not readily applicable to SMEs since they are not little large businesses (Hillebrand, 2009). Following a review of published materials, the following SME characteristics were identified:

2.1.3.1 Size & Resource Shortage
The obvious distinguishing feature of SMEs is their limited size in terms of staff and financial measures. All research highlights the scarcity of resources as one of the primary problems and main characteristic of SMEs (Singh and Garg 2008). The term “resources” is to be considered in terms of personnel, overall financial stability and security (Ligthelm and Cant 2003).
2.1.3.2 **SME Decision Making Authority**

Due to the size and ownership structure of SMEs, control and decision making authority resides in a single person (or at best a small group of people) who must deal with a multitude of different and often contradictory tasks simultaneously. This centering of decision making around the owner (Dhillon et al 2009) contrasts greatly with the fragmentation of the decision-making process in larger organisations; where top managers, are generally far removed from the point of delivery.

2.1.3.3 **SME Strategic Focus**

As SMEs have owner-managers who are centrally involved in the operational process, they typically develop a ‘production mode’ focus at the expense of strategic planning (Huin 2004) or at best they frequently switch between their strategic and operational functions (Spence 1999). Consequently their decisions are mainly based on personal skills and intuition rather than on an analysis of the available information (Cocca and Alberti 2010). Assuming the SME owner-manager to be the profit maximizing rational entrepreneur is unlikely to give a true reflection of the real circumstances (Spence and Rutherford 2000).

2.1.3.4 **SME Structure**

The decision structures of SMEs tend to be centralised, flat and informal with a high degree of internal transparency thus allowing coordination in the absence of formalised rules and procedures (Dhillon et al, 2009). This organic structure with loose informal working relationships is the opposite of the more bureaucratic, specialised and standardised behaviour common in larger organisations. In SMEs the communication process is likely to be easier to organise and manage with two-way, face-to-face communication the norm.

2.1.3.5 **SME Flexibility & Adaptability**

Where size can represent a weakness in terms of available resources, Garengo et al (2005) discovered it has a positive impact on flexibility and adaptability. SMEs are comparatively nimble in adapting to changes in their business environment and generating innovation due to their smaller size (Hillebrand 2009), the informality of their operations (Mac an Bhaird 2010), their less complicated bureaucratic structure (McAdam et al 2004) and having leaders who are close to the action who act as the main innovative catalysts for change (Culkin and Smith 2000).

Ghobadian and Gallear (1997) also described difference between SMEs and larger organisations. They identified the following in particular:

- Processes: SMEs require simple planning and control systems, informal reporting.
- Procedures: SMEs have a low degree of standardisation, with idealistic decision making.
- Structure: SMEs have a low degree of specialisation, with multi-tasking, but a high degree of innovativeness.
- People: Because of the high consequence of failure, people prefer tested techniques.
The first two points above imply that SMEs require less bureaucratic methods of management. The second two points above imply that SMEs require a strong focus on people.

Turner et al (2010) defined further differences within the overall SME structure in relation to project management needs. They conclude that small and micro-sized firms prefer more people focused approaches to project management that support their sense of family. They conclude that micro-sized and small firms need a micro-lite version of project management to support the generalists working on small teams, whereas medium companies would need a lite version which is still less bureaucratic than large companies but more structured than the micro-lite version to support a more specialist workforce.

This research paper will be focusing on the small and micro-sized firms, which represent 50.2% of the 67% of employment attributed to SMEs in the European Union.

2.1.4 SMEs and Project Management Use

In spite of the significant contribution SMEs make to the Irish, European and world economy there is comparatively little academic research published featuring them (Mac an Bhaird 2010; Turner et al 2009). Where available, the literature exhibits a research bias towards larger organisations and the methodologies and techniques employed for larger organisational research are not readily applicable to SMEs since they are not little large businesses (Hillebrand, 2009).

As shown in the previous section, many differences exist between SMEs and larger firms. Hence, competitive responses to the market cannot be applied to all environments and must be dealt with in respect to each organisations domain. More and more organisations are under pressure to develop and execute innovative business strategies and projects in order to stay competitive (Srivanna-boon and Milosevic 2006).

Fassoula and Rogerson (2003) cite that “global trends indicate that, in the near future, giant enterprises will dominate the market, influencing all its parameters and determining prices.” Because of this, SMEs will face many perils and run the risk of being excluded from the market place unless they can implement a management framework that delivers a competitive advantage.

One possible solution is project management, as using good project management practices can help organisations to better plan, organise, manage and control work which leads to better performance and increased productivity (Abbasi and Al-Mharmah 2000; Loo 2002).

2.1.4.1 SMEs and Project Management:

SMEs account for a significant portion of projects, Turner et al (2012) state that more than 40% of turnover for SMEs is undertaken as projects, and that this increases to more than 60% for SMEs in their first two years of existence. If these figures are extrapolated to the Global Economy one could state that $10 Trillion dollars are spent on SME projects annually.

In micro-sized companies the median sized project is 0 to 3 months; in small companies it is 3 to 6 months and in medium-sized companies it is 6 to 9 months (Turner et al 2012).
Turner et al (2010) found that requirements management was the core of project management practices used by SMEs. Tools for planning duration and resource usage and assigning roles and responsibilities were then popular and that the more bureaucratic systems oriented tools were not used. Their 2012 study found that the breakout of the top five elements of Project Management SMEs use was in the following order of priority:

1. Requirements definition – 87%
2. Use of milestones and milestone schedules – 71%
3. Work Breakdown Structure – 70%
4. Risk Management – 61%
5. Schedule Status Reports – 56%

Turner et al (2010) propose that traditional Project Management, which is very Taylorian in its approach, fails SMEs as described by Ghobandian and Gallear (1997) in two counts – both because it is too bureaucratic and because it fails to treat people as social animals. The paper concluded that SMEs require a simplified version of Project Management, which should have requirements definition at its core and more people focused methods which seek team member commitment are preferred. It must also be simple to use and show clear value to win support of doubters, especially the founder and entrepreneur, who must be convinced.

Greatbanks & Boaden (1998) also propose that SMEs want and need simpler and more manageable approaches to projects.

2.2 REQUIREMENTS:
In this section we assess the importance of requirements to projects success and identify best practices to guide the creation and management of good requirements, in line with the needs of research objectives 2 and 3:

2. Assess the importance of good requirements management in projects.
3. Identify some critical success factors for requirements management.

Randolph (1994) states, “Scope and objectives are the guiding principles that direct the efforts of the project team”, and Ward (1995) states, “they will determine a project’s success or failure”. Globerson (1997) states that the closer the product fits customer expectations, the higher the probability of completing the project successfully.
2.2.1 IT Project Success factors:
A requirement is a capability to which a product or service should conform to. A meticulous consideration to requirements engineering acts as a backbone of software projects whereas ambiguous and unrealistic requirements are major source of failure in software-intensive systems (Khan et al 2013).

In spite of decades of research, information technology type projects continue to fail. Wateridge (1995) investigated the key criteria on which the success of IT projects is judged, and the factors that are important in influencing the success or failure of IT projects. The evidence of his research shows that project managers concentrate on achieving timescales and budgets. His conclusion was that, for IT projects to be successful in the future, the criteria for success and associated factors that influence success need to be defined clearly, agreed by all parties at the start of the project, and reviewed as the project progresses. Project managers should be concentrating on success criteria relating to users and sponsors and, consequently, the factors to deliver those success criteria.

Morris and Hough (1987) suggest that projects can fail to meet certain criteria of budget and time, and still be considered a success. Turner (1993) provides a more extensive list for judging success:

- The project achieves its purpose.
- It provides satisfactory benefit to the owner.
- It satisfies the needs of the owners, users, and stakeholders.
- It meets its pre-stated objectives.
- It is produced to specification, within budget and on time.
- It satisfies the needs of the project team.

The extensions by Morris and Hough (1987) and Turner (1993) to the established criteria show that time and budget are only two of many criteria for judging the success of projects. Within the IT domain there has been little research and testing of project-success criteria (Wateridge 1995).

Wateridge (1995) concludes that there does not appear to be a consensus of opinion among researchers and authors on the criteria for judging project success and the factors that influence that success. What is evident is that, at the project outset, the criteria for success, and the factors that need to be employed to achieve that success, need to be defined and agreed by all parties.

2.2.2 CHAOS Reports – Project Success Factors:
The Standish Group (1995) surveyed IT executives for their opinions on why projects fail and succeed. The following table shows the respondent response on reasons why projects succeed.
The third success factor is clear statement of requirements. Any misinformation or over information here may result in the product having needless features and undesired functionality. This may also lead to increases in the budget and the allocated time to produce unwanted features or undesired functionality.

The following two tables identify the factors associated with challenged and impaired projects as identified in the Standish Report 1995.

<table>
<thead>
<tr>
<th>Success Factors</th>
<th>Respondent Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. User Involvement</td>
<td>15.90</td>
</tr>
<tr>
<td>2. Executive Management Support</td>
<td>13.90</td>
</tr>
<tr>
<td>3. Clear statement of requirements</td>
<td>13.00</td>
</tr>
<tr>
<td>4. Proper planning</td>
<td>9.60</td>
</tr>
<tr>
<td>5. Realistic expectations</td>
<td>8.20</td>
</tr>
<tr>
<td>6. Smaller project milestone</td>
<td>7.70</td>
</tr>
<tr>
<td>7. Competent staff</td>
<td>7.20</td>
</tr>
<tr>
<td>8. Ownership</td>
<td>5.30</td>
</tr>
<tr>
<td>9. Clear vision and objectives</td>
<td>2.90</td>
</tr>
<tr>
<td>10. Hard working/focused staff</td>
<td>2.40</td>
</tr>
<tr>
<td>Other</td>
<td>13.90</td>
</tr>
</tbody>
</table>

**Table 2: Success Factors (Standish Group 1995)**

The following two tables identify the factors associated with challenged and impaired projects as identified in the Standish Report 1995.

<table>
<thead>
<tr>
<th>Factors causing projects to be challenged</th>
<th>Respondent Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Lack of user input</td>
<td>12.80</td>
</tr>
<tr>
<td>2. Incomplete requirements and specification</td>
<td>12.30</td>
</tr>
<tr>
<td>3. Changing requirements and specifications</td>
<td>11.80</td>
</tr>
<tr>
<td>4. Lack of executive support</td>
<td>7.50</td>
</tr>
<tr>
<td>5. Technology incompetence</td>
<td>7.00</td>
</tr>
<tr>
<td>6. Lack of resources</td>
<td>6.40</td>
</tr>
<tr>
<td>7. Unrealistic expectations</td>
<td>5.90</td>
</tr>
<tr>
<td>8. Unclear objectives</td>
<td>5.30</td>
</tr>
<tr>
<td>9. Unrealistic timeframes</td>
<td>4.30</td>
</tr>
<tr>
<td>10. New technology</td>
<td>3.70</td>
</tr>
<tr>
<td>Other</td>
<td>23.00</td>
</tr>
</tbody>
</table>

**Table 3: Factors causing Challenged Projects (Source: Standish Group 1995)**
The top three factors associated with both challenging and impairing project success in Tables 4 and 5 are significant when considered in the context of this research. These factors touch on the need for good requirements throughout the project, the need for user involvement and the need for adequate resources.

All of these elements have been identified as obstacles for SMEs and their use of traditional project management.

### 2.2.3 REQUIREMENTS MANAGEMENT:

We now look at the factors associated with the production of good requirements.

#### 2.2.3.1 Requirements and the other Knowledge Areas

Many of the factors that cause projects to succeed including user involvement, clear business objectives, minimized or clearly defined scope and firm basic requirements are all elements of scope management (Schwalbe 2008). Defining the scope is seen as one of the most difficult aspects of project management (Schwalbe 2008).

Scope management can be more important to project success than any other individual knowledge area (Dekkers and Forsellius 2007). Scope management has been proven to effectively address five out of the six most common factors cited for cost overruns and uncontrolled project growth (Dekkers and Forsellius 2007).

These factors are:

- Lack of user input.
- Incomplete requirements.
• Changing requirements.
• Technology incompetence, and
• Unrealistic expectations.

Scope management has strong relations to the other knowledge areas and according to Dekkers and Forsellius (2007) scope management interacts and interfaces with the other 8 knowledge areas. When considering the latest edition of the PMI PMBOK (2012) we can add the latest knowledge area addition, Stakeholder Management, to this list also.

![Coverage of scope management concept](image)

**Figure 1:** Coverage of scope management concept (Source: Dekkers and Forselius 2007)

Although a knowledge base in itself, scope management plays a central role in ICT project management. The figure here shows how the boundary of scope management knowledge base extends through all the eight other knowledge bases. This is a depiction of the central nature of scope management in ICT project management (Dekkers and Forselius 2007).

### 2.2.3.2 Requirements – Prioritisation and Classification

The importance of customer requirement management in product development has been well-recognized in both academia and industry alike. Apart from offering market-focused products, which correspond to an average satisfaction of customer requirements, companies are pursuing a strategy of offering customer-focused products with a large degree of individuality (Tseng and Piller 2003). Customer requirement management thus becomes one of the principal factors for product development to succeed in the marketplace (McKay, Pennington and Baxter 2001).

Poor understanding of customer requirements and inaccurate assumptions made during the elicitation and analysis of requirement information have significant negative implications on design and manufacturing of the product in terms of quality, lead time, and cost (Jiao and Chen 2006).
2.2.3.2.1 Prioritising Requirements is Essential:
Prioritizing customer preference with respect to a set of customer requirements is essential (Griffin and Hauser 1993). This is always achieved through assigning different importance weightings for customer requirements. Such an indication of relative importance of requirements significantly affects the target values to be set for the engineering characteristics.

Kwong and Bai (2003) posit customer requirement prioritization as a multiple criteria decision making problem. Ho et al. (1999) propose to determine the importance weightings of customer requirements based on group decision making, where a set of criteria agreeable to all individuals are formulated to aggregate individual preferences into group consensus.

Gustafsson and Gustafsson (1994) apply conjoint analysis to prioritize customer requirements through pairwise comparisons.

2.2.3.2.2 Classification of Requirements:
The taxonomic approach to requirement management has attracted much attention (Morris and Stauffer 1994). A classification of requirements helps guide the designer in compiling, organizing, and analyzing product design issues (Rounds and Cooper 2002).

Fung et al. (1998) propose to categorize customer requirements based on the concept of affinity diagram. The advantage is its creative properties, rather than solely relying on logical or intellectual reasoning as with other statistical methods.

Information collected in a taxonomy is easy to manage and can ultimately be capitalized upon to improve product definition.

2.2.3.2.3 Weighting Classifications:
Gershenson and Stauffer (1999) introduced the assignment of relative weights to taxons in order to assist in prioritizing various requirements during the design process in a manner similar to the wisdom of customer importance ratings.

2.2.3.3 Requirements practices directly related to success
Verner et al (2005) surveyed a number of software practitioners regarding their software development practices. They found that overall, the best predictor of project success was that the requirements were good together with the requirements were managed effectively (93% of projects were predicted correctly). The survey showed that effective project management is fundamental to effective requirements engineering. Their motivation was to show which requirements engineering practices are directly related to project success.

A more recent survey of twelve UK companies found that requirements problems accounted for 48% of all software problems. Another survey of 150 companies in the U.S. showed that the majority requirements modeling technique of choice was “none” (Neill & Laplante 2003).
Not surprisingly, and consistent with observations made by Glass (1998), it was found that good requirements, that were complete and accurate at the start of the project, with a well-defined project scope, resulting in well-defined deliverables, were all positively correlated with project success.

The importance of user involvement in requirements gathering supports the observations of both Clavadetscher (1998) and Glass (1998). Verner et al (2005) found that if requirements were initially incomplete, completing the requirements during the project was positively correlated with project success.

Also, being able to effectively manage requirements and any changes to them through a central repository was positively correlated with project success. The fact that only 66% of projects used a central repository supports the suggestion that “we fail to use requirements management to surface (early) errors or problems” (Clavadetscher 1998).

Using logistic regression with the responses to the requirements questions, Verner et al (2005) found that the best predictor of project success was, the requirements were good, which predicted 89% successes, 58% failures, and 78% of projects correctly overall.

2.3 Value Management

2.3.1 Introduction:

Value management (VM) derives its power from being a team-based, process-driven methodology that uses function analysis to analyse and deliver a product, service or project at optimum whole life performance and cost without detriment to quality (Male et al 2006).

Value management developments were initially dominated by North American thinking (Dell’Isola 1988, Fallon 1980, Kaufmann 1990, Mudge 1989). It diversified during the late 1960s and into the 1970s internationally primarily through the manufacturing sector into Japan, the UK, Italy, Australia and Canada (Dell’Isola 1988).

Value relies on the relationship between the satisfaction of many differing needs and the resources used in doing so. Stakeholders, internal and external customers may all hold differing views of what represents value. The aim of value management is to reconcile these differences and enable an organisation to achieve the greatest progress towards its stated goals with the use of minimum resources.
2.3.2 The VM Process:

Successful VM is ‘...a style of management, particularly dedicated to motivating people, developing skills and promoting synergies and innovation, with the aim of maximising the overall performance of an organization. VM simultaneously addresses management goals, encourages positive human dynamics, respects internal and external environmental conditions and positively provides the methods and tools for achieving results.’ (British Standards Institution 2000: 6 and 8).

Teamwork and communications are fundamental and the main success factor of VM is the focus it brings on tangible results. It establishes a direct link between needs and results, through functions (Thiry 2004).

According to Thiry (2004), there are three key concepts:

1. The function
2. The cross-functional team
3. The structured process

The function and needs of the product or service are identified and agreed by the members of a cross-functional team comprising of stakeholders and project team members. The process is followed utilising a 40 hour workshop where the following stages are executed:

1. Initiation and Information
2. Functional Analysis
3. Creative Stage
4. Evaluate Ideas
5. Develop Proposals
6. Present Recommendations
7. Report

Some of the benefits attributed to the VM approach are as follows:

- Better business decisions by providing decision makers with sound basis for choice
- Increased effectiveness by using limited time and resource to best effect
- Enhanced competitiveness by facilitating and encouraging innovation
- Improve internal and external communication
- Fosters teamwork and multi-tasking
- Decisions agreed and supported by all stakeholders

Tohidi’s (2011) paper shows benefits gained from the use of VM across many industries. Tohidi proposes for every $1 invested in management, the use of VM projects obtains $4.53 savings in admin costs. Tohidi shows an example of how VM can be applied to IT also, not just construction.
2.3.3 Why VM?
Based on the research previously reviewed and the nature of small and micro-sized firms and their need for a micro-lite project management approach, the researcher theorises that the utilisation of VM should be considered.

This theory is based on the following observations from literature.

2.3.3.1 Project Success Factors
When reviewing the top ten success factors for successful projects as proposed by the Standish Report (1995) the VM approach can be positively related to delivering on at least seven of the factors, as shown in the following table.

<table>
<thead>
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<td>13.90</td>
</tr>
<tr>
<td>3. Clear statement of requirements</td>
<td>13.00</td>
</tr>
<tr>
<td>5. Realistic expectations</td>
<td>8.20</td>
</tr>
<tr>
<td>7. Competent staff</td>
<td>7.20</td>
</tr>
<tr>
<td>8. Ownership</td>
<td>5.30</td>
</tr>
<tr>
<td>9. Clear vision and objectives</td>
<td>2.90</td>
</tr>
</tbody>
</table>

Table 5: Success Factors (Source: Standish Group 1995)

When factors that create challenges for projects are reviewed (see Table 2) it can be seen that ‘Factor 6 – Lack of Resources’ is also addressed by the VM approach which strives to maximise delivery based on needs and available resources.

When factors which impair project success are reviewed it can be seen that the VM approach addresses all of the top 6 factors, as seen in the following table.

<table>
<thead>
<tr>
<th>Factors causing projects to be impaired</th>
<th>Respondent Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Incomplete requirements</td>
<td>13.10</td>
</tr>
<tr>
<td>2. Lack of user involvement</td>
<td>12.40</td>
</tr>
<tr>
<td>3. Lack of resources</td>
<td>10.50</td>
</tr>
<tr>
<td>4. Unrealistic expectations</td>
<td>9.90</td>
</tr>
<tr>
<td>5. Lack of executive support</td>
<td>9.30</td>
</tr>
<tr>
<td>6. Changing requirements and specifications</td>
<td>8.70</td>
</tr>
</tbody>
</table>

Table 6: Impaired Projects (Source: Standish Group 1995)
2.3.3.2 Requirements Management

From previous discussions in the requirements section the need for prioritisations, classification and weighting of requirements has been established and also the need for group decision methods for consensus building (Ho et al 1999; Kwong and Bai 2003; Gustafsson and Gustafsson 1994; Rounds and Cooper 2002; Gershenson and Stauffer 1999). The VM process provides the methods and tools (FAST Diagrams and paired comparison) to achieve these for the cross-functional group.

The process, if followed, also provides the opportunity to create requirements at the start of the project and provide centralise requirements for the duration of the project, which have both been linked to project success (Verner et al 2005; Glass 1998; Clavadetscher 1998)

2.3.3.3 Summary

Based on the VM theory supporting:

- Project Success criteria
- The creation of good requirements – Agreed, Prioritised, Classified, Centralised, up front
- Providing a people and resources focused approach
- Simple and effective Process, Tools and methods
- Innovation and flexibility

The researcher believes that assessing how small and micro-sized firms utilise project management and manage requirements can provide the information required to support the exploration of whether the VM approach can provide the foundations for a micro-lite project management approach.

2.4 Literature Review Summary

From the literature review it has been established that small and micro sized firms are a significant sector. SMEs are also very different in a number of ways to larger companies and because of these differences, their needs from, and use of, project management has to change from the more systems oriented traditional approach. A lite or micro lite approach based on a requirements focus is needed.

To have good requirements needs good project management (Verner et al 2005) and therefore to progress this research the following must be explored with the participants:

- How the participants use Project Management.
- Requirements Management methods used by the participants, based on the practice elements identified from literature – Centralised Requirements, Prioritised Requirements, Clear Requirements at the start of a project, Requirements Management Method employed, User involvement in requirements
- What do the participants think of the VM approach as a basis for requirements management.

Based on the findings from the participants the potential for a VM based solution can be assessed.
3  Research Design & Methodology
Overall, a Qualitative Research Strategy is employed for this research.

In explaining qualitative research, Denzin and Lincoln (1994) state that, qualitative implies an emphasis on processes and meanings that are not rigorously examined, measured in terms of quantity, amount, intensity, or frequency. Therefore, there are instances, especially in the social sciences, where researchers are interested in insight, discovery, and interpretation rather than hypothesis testing (Merriam 1988).

The task of social scientists should not just be to gather facts and measure how often certain patterns occur, but to appreciate the different constructions and meanings that people place upon their experience (Easterby-Smith et al. 1991).

3.1  Research Strategy:
The Research Philosophy applied would be best described as interpretive, providing for the need to operate within a natural setting in order to establish trust, participation, access to meaning and in-depth understanding.

Following the review of the literature, it is apparent that there is a lack of both qualitative and quantitative research in the area of Requirements Management and its methods in Irish IT small and micro-sized firms. Because of this relatively under researched area, the objectives of this study highlighted the need for the Research Design to be exploratory in nature.

The primary method of data collection used, to gather the detailed opinions and perspectives needed, was a semi structured personal interview. The aim of the interview was to ensure that there was sufficient detail and coverage of the research questions (Eisenhardt 1989), and interviews are particularly appropriate for researching concepts that are at an early stage of maturity (Benbasat et al. 1987). This also provided the opportunity to ask additional questions, if necessary (Cooper and Schindler 2001).

3.2  Sampling and Participant Selection:
The semi-structured interviews were conducted with founders from six small and micro-sized firms, drawn from a sample of companies who have requirements management as a focus with their customers. This is consistent with ‘judgment sampling’ (Sekaran 1992). Consequently, the findings of this research are based on the opinions and experiences of each of the candidates within the context of their own organisation (McHugh and Hogan 2010).

The rationale for the selection of this sample was that companies actively engaging with customers and delivering projects and products would be most involved with requirements management. The interviews were taped and transcribed.
3.2.1 Profile of the Organisations:

The target profile of participant organisations for this research adhered to the criteria recommended by the European Commission (2005, 2008) which defines the medium, small and micro enterprises as follows:

<table>
<thead>
<tr>
<th>Enterprise Category</th>
<th>Headcount</th>
<th>Turnover (million €)</th>
<th>Balance Sheet Total (Million €)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medium-sized</td>
<td>&lt;250</td>
<td>≤ 50</td>
<td>Or</td>
</tr>
<tr>
<td>Small</td>
<td>&lt;50</td>
<td>≤ 10</td>
<td>Or</td>
</tr>
<tr>
<td>Micro</td>
<td>&lt;10</td>
<td>≤ 2</td>
<td>Or</td>
</tr>
</tbody>
</table>

*Table 7: SME qualifying criteria (Source: European Commission 2005)*

Further to these criteria the research required the small and micro-sized participants of this study to be Irish-based and involved in the Information Technology industry.

3.2.2 Profile of the Participants:

The target profile of participant employees within participant organisations for this research adhered to the following guidelines to assure the significance of the opinions gathered:

- Small-sized: interview based on Owner / Founder / CEO of the organisation.
- Micro-sized: interview based on Owner / Founder / Director of the organisation.

<table>
<thead>
<tr>
<th>Company</th>
<th>Age (Yrs)</th>
<th>Size</th>
<th>Employees</th>
<th>Turnover (€)</th>
<th>Participant Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>8</td>
<td>Micro</td>
<td>9</td>
<td>200K</td>
<td>Founder</td>
</tr>
<tr>
<td>B</td>
<td>3</td>
<td>Small</td>
<td>&lt;20</td>
<td>3M</td>
<td>Founder</td>
</tr>
<tr>
<td>C</td>
<td>6</td>
<td>Small</td>
<td>16</td>
<td>&lt;3M</td>
<td>Founder</td>
</tr>
<tr>
<td>D</td>
<td>8</td>
<td>Small</td>
<td>25</td>
<td>3M</td>
<td>Founder</td>
</tr>
<tr>
<td>E</td>
<td>7</td>
<td>Micro</td>
<td>18</td>
<td>1M</td>
<td>Founder</td>
</tr>
<tr>
<td>F</td>
<td>3</td>
<td>Micro</td>
<td>4</td>
<td>10K</td>
<td>Founder</td>
</tr>
</tbody>
</table>

*Table 8: Participant characteristics*
Company A is an 8 year old micro-sized firm providing a software product and some supporting services to a specialised sector. Company A has 25 customers with 10 to 12 customers active at any one time.

Company B is a 3 year old small sized firm providing a software product to a specialised sector. Company B has upwards of 1000 customers which vary in size from large multinationals to smaller resellers.

Company C is a 6 year old small sized firm providing a product design and manufacturing service, end to end. Company C has approximately 20 customers with 10 to 15 active at any one time. Customer size varies from large multinational to SMEs.

Company D is an 8 year old small sized company providing two main software products to vertical markets. Company C has approximately 220 customers and interact with them regularly through their support contracts.

Company E is a 7 year old micro sized company providing a number of services, like business process improvements, to 20 or 30 active customers. Enterprise sized customers make up 80% of their business and 60% of their Enterprise customers are public sector customers.

Company F is a 3 year old micro sized company in the early stages of launching an internet based, mass market application. Up until recently this application has been in beta release.
4 Interview Results

The approach to the semi-structured interviews was formulated from the findings from the literature review which revealed that, due to the relative lack of literature on SMEs, an exploratory methodology should be undertaken. Four areas were identified to be explored which would ensure relevant information for the analysis of the research question could be gathered.

4.1 The Nature of the Participant Companies

The first area focused on determining the size of the participating companies and the role of the interviewees as this research focuses on the small and micro sized companies. This was achieved by asking about the following and applying the European Commission (2005) sizing definitions:

- Age of the company
- Number of Employees
- Turnover
- Role of the interviewee

These questions resulted in the following table.

<table>
<thead>
<tr>
<th>Company</th>
<th>Age (Yrs)</th>
<th>Size</th>
<th>Employees</th>
<th>Turnover(€)</th>
<th>Participant Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>8</td>
<td>Micro</td>
<td>9</td>
<td>200K</td>
<td>Founder</td>
</tr>
<tr>
<td>B</td>
<td>3</td>
<td>Small</td>
<td>&lt;20</td>
<td>3M</td>
<td>Founder</td>
</tr>
<tr>
<td>C</td>
<td>6</td>
<td>Small</td>
<td>16</td>
<td>&lt;3M</td>
<td>Founder</td>
</tr>
<tr>
<td>D</td>
<td>8</td>
<td>Small</td>
<td>25</td>
<td>3M</td>
<td>Founder</td>
</tr>
<tr>
<td>E</td>
<td>7</td>
<td>Micro</td>
<td>18</td>
<td>1M</td>
<td>Founder</td>
</tr>
<tr>
<td>F</td>
<td>3</td>
<td>Micro</td>
<td>4</td>
<td>10K</td>
<td>Founder</td>
</tr>
</tbody>
</table>

Table 9: Participant characteristics
4.2 The Nature and use of Projects within the company

The second area of questioning focused on the nature and use of projects within the participating companies. From the literature review it is established that SMEs do use project management but because of differences associated with SMEs compared to larger companies, the needs and use of project management are different. To validate whether and how participants use project management and assess if any of the previously identified differences can be observed, questions relating to the following were asked:

- The use of project management methodologies
- The utilisation of a project approaches for Internal and /or external projects
- The average length of projects undertaken
- Do staff have project management qualifications
- The resourcing of projects
- The type of business offering

Results are identified in the following two tables.

<table>
<thead>
<tr>
<th>Company</th>
<th>Size</th>
<th>Age</th>
<th>Staff</th>
<th>Full Time</th>
<th>Part Time</th>
<th>Contract/Vendor</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Micro</td>
<td>8</td>
<td>9</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>B</td>
<td>Small</td>
<td>3</td>
<td>20</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>C</td>
<td>Small</td>
<td>6</td>
<td>16</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>D</td>
<td>Small</td>
<td>8</td>
<td>25</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>E</td>
<td>Micro</td>
<td>7</td>
<td>18</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>F</td>
<td>Micro</td>
<td>3</td>
<td>4</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
</tbody>
</table>

Table 10: Participant use of resources

<table>
<thead>
<tr>
<th>Company</th>
<th>Size</th>
<th>Internal</th>
<th>External</th>
<th>Offering Type</th>
<th>Qualified PM Staff</th>
<th>PM Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Micro</td>
<td>Yes</td>
<td>No</td>
<td>Product</td>
<td>PM Qualification</td>
<td>Many of the team have PM and PRINCE.</td>
</tr>
<tr>
<td>B</td>
<td>Small</td>
<td>Yes</td>
<td>Yes</td>
<td>Product</td>
<td>People in growth qualifications in PM.</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>Small</td>
<td>Yes</td>
<td>No</td>
<td>Service and</td>
<td>Founder has MPM</td>
<td>Own design based on experience and PM-trained. Customisable by customer.</td>
</tr>
<tr>
<td>D</td>
<td>Small</td>
<td>Yes</td>
<td>Yes</td>
<td>Product</td>
<td>Yes, people qualified</td>
<td>Own approach. PMP-based. Has understanding of various e.g. PRINCE assets available public sector in it.</td>
</tr>
<tr>
<td>E</td>
<td>Micro</td>
<td>Yes, ISO5000 certified</td>
<td>Yes</td>
<td>Service</td>
<td>Yes, qualified people</td>
<td>Own approach. PMP-based. Has understanding of various e.g. PRINCE assets available public sector in it.</td>
</tr>
<tr>
<td>F</td>
<td>Micro</td>
<td>No, not really</td>
<td>Yes, lightweight</td>
<td>Project and integrated</td>
<td>No PM qualifications needed</td>
<td>Nothing formal. Email and tasks list.</td>
</tr>
</tbody>
</table>

Table 11: Participant use of project management
4.3 The Nature of Requirements Management

Having established an insight into the nature of the companies and their use of project management from the previous sets of questions, this third focus area explores how the participants approach requirements gathering and management. This section is critical as the micro lite project management approach must be based around a core of requirements management, as established from the literature. The questions in this section were guided by the best practices for requirements management identified in the literature review section, and covered the following areas:

- The method/process used to gather requirements
- Are requirements centralised?
- Are requirements prioritised?
- What level of user involvement is utilised?
- Are requirements clear at the beginning of a project?

The results from these questions are seen in the following table.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Micro</td>
<td>Product</td>
<td>8</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>50-70%</td>
<td>Evolutionary</td>
<td>Y, difficult</td>
</tr>
<tr>
<td>B</td>
<td>Small</td>
<td>Product</td>
<td>3</td>
<td>Y</td>
<td>N</td>
<td>Y, own design</td>
<td>Y</td>
<td>80%</td>
<td>Evolutionary</td>
<td>Y, VIP</td>
</tr>
<tr>
<td>C</td>
<td>Small</td>
<td>P&amp;S</td>
<td>6</td>
<td>Y</td>
<td>N</td>
<td>Y, own design</td>
<td>Y</td>
<td>&lt;50%</td>
<td>Evolutionary</td>
<td>Y, VIP</td>
</tr>
<tr>
<td>D</td>
<td>Small</td>
<td>Product</td>
<td>8</td>
<td>Y</td>
<td>N</td>
<td>Y, own design</td>
<td>Y</td>
<td>80%</td>
<td>Evolutionary</td>
<td>Y, VIP</td>
</tr>
<tr>
<td>E</td>
<td>Micro</td>
<td>Service</td>
<td>7</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>Varies</td>
<td>Evolutionary</td>
<td>Y</td>
</tr>
<tr>
<td>F</td>
<td>Micro</td>
<td>Product</td>
<td>3</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>80%</td>
<td>Evolutionary</td>
<td>Y</td>
</tr>
</tbody>
</table>

Table 12: Participant requirements management summary

4.4 Value Management Discussion

Based on the discussions around the earlier set of questions, the interviews were concluded by having a discussion with the participants on the applicability of the VM approach to their situation. This section began with an introduction to the VM approach, to follow up on the VM information provided to the participants ahead of the interview.

- Introduction to VM, its tools and process
- Discussion with the participants on their perceived positives and negatives of the VM approach as a potential foundation for a requirements focused project management micro lite approach
The results from this section produced a series of positive and negative findings which are discussed more in the Findings and Analysis section of the paper.
5 Analysis and Findings:

5.1 Introduction
This section reviews the findings from the semi-structured interviews carried out. Based on these findings an assessment of the suitability of the VM Approach as a foundation for a Project Management micro-lite solution for small and micro firms is carried out.

5.2 The Nature of the Participant companies
From Table 9 in the results section we find that all participants qualify as being either a small or a micro sized company and all interviewees are founding members of their company, satisfying the profile of the organisations and participants as detailed in the Design and Methodology.

5.3 The Nature and use of Projects within the company

5.3.1 SME Differences:
Throughout the literature associated with SMEs we have seen that SMEs are different in many ways to larger organisations. Many of these differences have been observed through this research.

5.3.1.1 SME Resourcing
All research highlights the scarcity of resources as one of the primary problems and main characteristics of SMEs in general (Singh and Garg 2008). This can clearly be seen in Table 10 where all of the participants utilise part time and/or contract/external vendor resources to ‘flex’ when needed.

For example, Company E contracts in specialist resource outside of current core competencies when needed. When certain specialisations become more of a core competence then the company employs a full time person in this space.

5.3.1.2 SME Structure and Decision Making Authority:
Dhillon et al (2009) observed there is a centering of decision making authority around the founders of SMEs and they must deal with a multitude of different and contradictory tasks simultaneously.

This behaviour was also observed during the participant interviews for this research for both the small and micro sized firms. For example, Company B utilises multiple members of staff to gather requirements, developers as well as founders, but all requirements gathered are then reviewed internal by the founders before being sent out again.

The centralised, flat and informal decision structures are also observed as seen in previous research by Dhillon et al (2009) and this was evident across all participants in the study. Two way face-to-face communications was also very evident within most all of the participant firms. Company B puts particular importance on the advantage their small size adds to their capability to communicate as a
group easily and effectively whereas Company C is the only participant with geographically dispersed resourcing; their manufacturing is completed by contract staff in China.

5.3.1.3 SME Strategic Focus:
Spence (1999) observed that founders of SMEs have to frequently switch between their strategic and operational functions. This behaviour was evident from the participant interviews where all of the interviewed founders, apart from Company D, are heavily involved in both operational and strategic tasks. Company D at this point in its evolution has a distinction between operational product development and strategy but it was still very evident that the founder is aware and significantly involved in both.

For the participants who have software products in the market (Companies A, B, D and F), it was evident that the founders are intimately involved in their product roadmaps and focusing on generic functionality to grow the customer base and to increase the markets for the product.

5.3.1.4 Flexibility & Adaptability:
All participants saw this as a differentiator for them – especially those dealing with larger enterprises like Customer’s B, C, D and E.

For the small-sized firms, working from standard templates aligned with their own specific needs, they can adjust when needed very simply based on their flat and flexible structures and open communications.

This flexibility was seen as critical in dealing with change where all participants make allowances for changing requirements to occur over time – this is further discussed in the requirements section of the findings.

For all of the participating firms, changes can be discussed and decisions made much more rapidly than at their larger customer firms, reflecting the process and bureaucracy needs of larger firms proposed by Ghobadian and Gallear (1997).

5.3.2 Use of Project Management:
Overall this research observed many of the findings from previous research in this area, see Table 11. The traditional, Taylorian and systems orientated, approach to project management was rejected by all of the participants in line with the reasons highlighted by Ghobadian and Gallear (1997), where traditional project management present processes which are too bureaucratic; procedures which encourage specialisations; rigid structures which stifle innovation and an approach that does not support the people focus required for this sector.

Having said this, all participants are very much aware of project management and the need for planning and control in their organisation. All but one company (Company F) had at least some staff that held project management qualifications. Companies A, C and F had founders with qualifications in project management ranging from Prince and PMI qualifications to a Masters Degree in Project Management.
for the founder of Company C. The small participants (Company B, C and D) are progressive and ensure that all of their staff are trained in the project method employed by the organisation. Micro firm Company E is also well progressed in project training and is ISO9000 certified internally.

All participants who employ some project management approach have based it primarily on PMI standards and adjusted based on experience and firm needs. Their goal is to have enough planning and control to be successful while remaining flexible. To that end all the small sized firms seem to be clear on what they are leaving out rather than trying to include all aspects of a systems oriented traditional Project Management implementation.

All participants apart from Company F run projects for both internal operational works as well as for external growth work with customers. Although, most all participants interviewed confessed to being less stringent in relation to internal projects, apart from Company E which is ISO9000 certified internally. A number of the founders interviewed also highlighted that internal work tended to be less complex given their current size so required less formality.

External project work is heavily influenced by the customer the work is being completed for, particularly for service oriented firms. Some customers require stringent processes to be followed but for the main part it seems that a lot of the project organisation and delivery is managed by the small and micro companies themselves.

This is particularly true for the participants with software products where they are looking to provide generic enhancements to satisfy a larger customer base. Whereas, the service oriented firms have a more personal relationship with the customer as they deliver specifically to an individual customer rather than a customer base.

These companies rely on their innovativeness and flexibility much more than the larger companies they deal with who tend to have several business units and geographically dispersed specialists. The quick and easy communications possible and the generalist staff and quick decision making available to the small and micro sized firms provide a big advantage. Any processes or procedures they engage with need to support this approach.

A further observation is that each small and micro sized firm has a narrow business focus at this stage of their existence and are generally in niche/vertical markets. This leads to their process and procedural needs being quite specific compared to a more diverse multinational.

The small sized software product participants (Company B and D) are utilising a hybrid of agile and waterfall to achieve their projects with a more agile approach being used for the development aspects of their software products. All of the software vendor firms are delivering releases on a quarterly basis and all are leaving room for requirements to change in their process.

The lengths of projects seems to vary significantly across the participants but are mainly in line with the findings of Turner et al (2012) with few projects running over six months in duration. Of the projects that do, the reason is mainly due to inactivity at the customer side. For example, Company E has an ongoing
project with a customer which started 14 months ago but due to external delaying factors not much has actually happened for 13 of those months.

It is significant to notice that Project Management is promoted and understood by all of the founders which is in line with the founder backing needed to implement it as discussed by Turner et al (2010).

5.4 The Nature of Requirements Management:
All of the participants in this research recognised the importance of managing requirements, see Table 12. Company B stated that this is the biggest pitfall in software development, in particular, and if requirements are not right the project will fail. This reflects Ward (1995) who says that requirements will determine the project’s success or failure.

Requirements Management in general has been recognised as important to very important by all of the participants and all participants try and manage requirements in various ways. This reflects Turner et al’s (2012) observation that 87% of SMEs use the Requirements definition element of Project Management.

5.4.1 Method of collection:
It is interesting to notice that all of the small sized firms are utilising a defined method for collecting and managing requirements based on their own hybrid design based on previous experience and firm needs. These firms also utilise their own templates to support this process which can be evolved over time and customised to an extent for new customer projects.

5.4.2 Requirements Clear at the start of a project:
As can be seen from Table 12, none of the participants have experienced having full requirements in place at the start of a project. In fact, Company C stated that given the nature of their business it would never be the case that requirements would be fully known at the start. This is because they are involved in the design and manufacture of products. Company C states that time for creativity and innovation is critical to their overall process. What is interesting is that all companies strive to achieve a point in time when requirements are at 100% before the project ends, in line with the findings of Verner et al (2005) which states this practice has a very positive effect on a successful project outcome.

This need to iteratively manage requirements is one of the major findings from this research, for all of the participants involved, they all need processes that support the evolution and iteration of requirements with their customers to support their flexible approach.

A number of reasons were forwarded as to why requirements don’t get to a 100% readiness state at the start of projects. The Requirements Process can be very customer dependent. Customers may not fully understand what they want themselves, customer project staff have other jobs and may have difficulty with getting the time to be heavily involved initially in a project. It was also stated that the participant firms do not always get to be involved in a customer project from the very start; they may be included late or may only get involved as part of a project recovery effort. IT and software related projects tend
to be more susceptible to change as they progress through initial requirements, demonstrations and prototyping.

Company A gave an example of having 25 documents generated from an initial requirements workshop. The prototyping phase generated over 60 change requests and by the time the project completed and exited development there were 80 to 100 change requests applied to the original requirements.

So, to satisfy the customer these small and micro companies need to be flexible enough to take an iterative approach to deliverables and manage requirements along with expectations over a period of time. All participants stated they have to work in this way.

For the software vendor participants, we see an agile approach used more to help incorporate changes. This was the biggest issue for Company D but they move to an agile approach to allow them to deal more effectively with change and to deliver on a quarterly rather than a bi-yearly basis.

5.4.3 Prioritised Requirements:
All participants declare that they prioritise their requirements. This prioritisation is done mainly on the basis of cost and delivery time rather than based purely on needs and overall business value. For the software product vendors, their high level strategic requirements are prioritised more on value to the general customer base and enabling functionality which will provide opportunity for growing the customer base and increasing usage and revenue with existing customers. For these vendors, the consensus is gained internally through specifically arranged monthly company meetings (Customer B and D) or through more ad-hoc and iterative reviews as projects progress like Companies A, C, E and F.

5.4.4 Centralised Requirements:
An important reason to centralise requirements is to ensure they can be managed as they change (Verner et al 2005). Given this and the finding that all participants need to iteratively manage their requirements, it is surprising to see that not all of the participants profess to have their project requirements centralised.

Company A professes to be weak in this particular area and would love to have access to a simple and cost effective tool which would help manage requirements. This is one of Company A’s biggest issues as they do not version and manage changes to original specifications as well as they should. This is mainly due to customer pressure to ‘get the job done’. The founder of Company A states that the current status on this is not at all satisfactory and causes many issues and lost time.

All of the small sized companies have centralised requirements and are able to state that they manage these by project.

5.4.5 Critical Success Factors (CSFs) and Key Performance Indicators (KPIs):
None of the participants utilise the creation and management of explicit CSFs and KPIs for their requirements.

Company B stated that they don’t do this as they are probably not mature enough to do this as of yet. The founder of Company B also stated that they had worked for large companies like IBM in the past.
and have never come across these and never seen or worked for a company who has come back after a project to evaluate CSFs and KPIs. What they do measure is change requests and defects.

Other participants also stated that the measure of success is mainly achieved through the testing of required functionality with the customer and agreement is reached at that point.

Again, because these participants are often not in at the feasibility stage of a project they are not engaged in the reasons behind why a company would want something from an overall benefits perspective. Some participants stated that it could be beneficial at the program level but at the lowest level there are too many requirements and to explicitly create CSFs and KPIs against each requirement would be too bureaucratic and time intensive, mostly customers want the small and micro firm to get the work done.

The participants tended to get the operational work from their customers rather than the strategic work, particularly in the services oriented firm. Company B and Company C stated that for the main part large multinationals tend to farm out non-core work to the SME sector.

The software vendor participants have a greater say in relation to CSFs and KPIs but, in line with the findings of Cocca and Alberti (2010), decisions are based on the personal skills and intuition of the founders rather than any formal analysis. For example, Company B is working on adding Internationalisation and Multi-Currency to their product which will allow one of their biggest existing customers to roll out the product to 3000 resellers in Asia.

5.4.6 User Involvement:
What has become apparent from this research is that the nature of a business has an impact on the opportunity for user involvement.

For participants with software products it is much more difficult to say ‘get the users involved’ as they deliver a generic product to many customers. These customers may often be competitors of each other.

In this situation the user involvement discussed focused on two areas, the involvement of internal staff in requirements management and the involvement of customers in requirements management.

Channels for customers to raise issues and enhancements are achieved, for example, by Company D by relying on a core of important customers who would be consulted on any changes or proposed new functionality. Company B also engages with customers when they have decided on the content of their next release and try to give all main customers something at least once or twice per year. What they find is that even though they send out information in relation to upcoming releases and ask for approvals most customers do not respond.

These software vendor companies do seem to rely heavily on internal staff engagement when reviewing requirements and future functionality. Company C, the product design and manufacturing company, see this as extremely important to them to get the whole team engaged and see it as part of their culture. Company B also sees internal engagement as critical to get staff engaged.
For the services oriented companies (Company E and C) this engagement is seen as critical to get customer understanding and the ownership it brings to the project. It also significantly helps the transition phase for deliverables.

All of the participants find it difficult to get as much customer interaction as they would like. Company C finds an iterative approach is necessary for the customer staff to have time to think and it leads to better and richer conversation the next time they meet.

5.4.7 Other observations on Requirements
This research shows that all small sized firms who participated have got their ‘own design’ approach to requirements management, planning and control whereas none of the micros have, although Company E is flexible dependent on the nature of the project and operates as a projectised organisation with good but light internal processes to support themselves.

The small sized companies also recognise and understand what they are leaving out from the more traditional PM approach and have qualified and experienced project staff that work in a generalist way.

5.5 Value Management Discussion
From discussion with the participants, the principles of VM are seen as very valid but the overall VM process is seen as still being too time consuming and bureaucratic for the small and micro-sized firm by all of the participants. From discussions a number of positive and negative aspects of the VM approach were raised.

5.5.1 The Positives:
All participants like the concepts and principles of the VM approach and all stated that the process would help make all involved in a project ‘think’ more before acting and understand the needs behind the function.

Company A thought it may be useful on a case by case basis, depending on the nature of the project and the customer and also thought that it may be useful if bogged down in requirements or if in a project recovery situation.

Company C thought it could be useful for other SMEs they deal with to use as those do not tend to do commercial and feasibility analysis and waste lots of time on product design. It may not make projects any more successful but it would kill failures earlier.

Company D really liked the FAST Diagrams from the VM Tools. They could see them being used by the sales team when speaking with potential customers. The sales team could identify the customer’s main needs and functions and then the participant could focus their pitch and product demonstrations based on a customer’s specific needs.
All participants considered it a relevant process. But Company D, along with most of the other participants, feel that they are following several of the principles as it is and, what they do works for them.

Many of the participants, especially Company E, felt that the tools looked simple and useable and definitely wanted to look into the process overall and see what could add value to what they already have.

5.5.2 The Negatives
All participants state that having a 40 hour workshop is not feasible for them or their customers. There are many reasons for this, from getting customer time to having too many customers who are competitors of each other. But, the main reasons given relate to the absolute need to be able to support an iterative requirements process with customers.

It is not iterative enough as particularly IT Projects change as they progress and a lot of time can be wasted by doing a 40 hour workshop when it is probably not very clear what the final delivery will look like. It would be nice to think that all of the information would be available at the start of a project but this is not the case.

Participants may not always be involved early enough in a project to make best use of a process like this. Participants are often delivering parts of an overall project rather than the whole thing.

Company B suggests it may be better used in big specialised companies to kill the ‘noise’ one gets around requirements in those situations.

Company A stated that this could be ‘just another process’ where people go through the motions and don’t engage in the way it would be needed to make something like this work.

Company E stated, 40 hours is too much, ‘not feasible or workable for us or our customers’. People need time to internalise and time to think as they are most always not fulltime on a single project. This time, in their experience, leads to richer conversations at the next meeting. There is an absolute need to evolve requirements through multiple meetings and quickly. Probably better to use this at program level for value and benefits management.

Company F stated that no-one has that amount of time to give all in one go and there is an absolute need for a more iterative and evolutionary approach to projects and requirements management. Company F also thinks that after spending 40 hours at a workshop initially, there would probably still be lots of changes to manage afterwards so it is better to evolve things. What would be much more useful for Company F would be a set of checklists or a toolbox to guide and help them to at least consider what needs to be considered.

So in summary, the negatives outweigh the positives from a small and micro sized firm perspective.
6 Conclusions and Next steps:

From this research we see that small and micro sized firms are very much aware of project management and requirements management and the need for them. Of the participants interviewed, most all have qualified project staff and a good understanding of project methodologies.

One of the characteristics of a project is that it is unique and we can see that small and micro sized firms are also very unique. They are not just different to larger companies, as discussed in the literature, but are also quite different to each other. They are involved in focused and mostly niche markets and products with very specific needs.

What is common to all of the participants is a need for a micro lite process for requirements management. Any such process must support an iterative approach to aid the small and micro sized firms maintain their main differentiator, flexibility.

The main influencing factors noted requires this process to account for part-time project workers both in the customer and participant firms, current stage of the firm’s development, customer influence and type of business offering as well as supporting an evolving and iterative approach.

Because of these factors, the VM approach is still seen as being too inflexible and bureaucratic as a possible solution to a Project Management micro-lite solution to requirements management for small and micro sized enterprises. Some companies, like Company D and Company B do want to look at the VM process but from a perspective of seeing what elements they can add to their existing processes. As Clelland and King (1972) stated ‘Any model, whatever its nature, must be constructed through a process of determining which elements of the system are sufficiently important to be incorporated into the model and which are not’.

Future research effort should look at two areas in parallel; the various characteristics of SMEs themselves and their customers as well as the ‘own design’ efforts all of the small participants in this study had created.

As the small firm participants were, in general, quite happy with their own designs for requirements management it would be worth assessing a larger population who have their ‘own design,’ looking to create a generic starter pack from this research. This would help the entry level micro sized firms get something practical they in turn could evolve into their ‘own design’ based on the grounded truth of their reality, much as was requested by Companies A and F in this research.

For the practitioner it is important to recognise that small and micro sized firms are unique and rely on maintaining a flexible approach. Trying to implement a systems oriented project approach will not receive backing and will not support firm needs. The project manager practitioner can aid their small and micro firms by helping them understand and manage the risks they are taking and evolve a relevant
‘own design’ for company needs. It seems that the biggest concern for the micro sized companies in this research was based on the fear of what they were forgetting about rather than what they were doing.
7 Bibliography


