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TABLE OF CONTENTS

TABLE OF CONTENTS	3
REFERENCES	3
EXECUTIVE SUMMARY	4
1 INTRODUCTION.....	5
1.1 INTRODUCTION.....	5
1.2 ENGAGEMENT PRACTICES AND THE DBE	6
2 THEORETICAL ISSUES WITH STUDYING ENGAGEMENT	9
INTRODUCTION.....	9
2.1 TWO PROBLEMS WITH STUDYING ENGAGEMENT: MANAGERIALISM AND RESEARCH TRADITION.....	9
2.2 ENGAGEMENT PRACTICES	10
2.3 THE ‘PRACTICE LENS’ FOR STUDYING TECHNOLOGY	12
2.4 ACTOR-NETWORK THEORY.....	13
3 RESEARCH METHODOLOGIES FOR STUDYING ENGAGEMENT	14
3.1 INTRODUCTION.....	14
3.3 GROUNDED RESEARCH METHODS – ANALYSING FIELDWORK DATA	16
3.4 DATA COLLECTION	18
4 USING GROUNDED METHODS TO CARRY OUT ENGAGEMENT RESEARCH: A WORKED EXAMPLE	22
4.1 INTRODUCTION.....	22
4.2 FIELDWORK NARRATIVE.....	22
CODING WORKSHOP, TAMPERE, 14.05.05 - 15.06.05.....	22
4.2 GENERATING CONCEPTS AND CORE CATEGORIES	25
CODING WORKSHOP, TAMPERE,.....	26
14.05.05 - 15.06.05.....	26
5 RESEARCH RESULTS	33
5.1 INTRODUCTION.....	33
5.2 CONCEPTS DERIVED FROM ANALYSIS	35
5.2.1 <i>Engaging with technical innovation</i>	35
5.2.2 <i>Regional perspectives</i>	37
5.2.3 <i>SME perspectives</i>	40
5.2.4 <i>Engaging with project instruments</i>	42
5.2.5 <i>From research project to community</i>	44
5.2.6 <i>From first contact to engagement</i>	46
5.3 PRACTICAL RESEARCH CONTRIBUTIONS TO ENGAGEMENT	48
6 TOWARDS A THEORY OF ENGAGEMENT	51
6.1 INTRODUCTION.....	51
6.2 CREDIBILITY AND ATTUNEMENT IN SME ENGAGEMENT PRACTICES	51
7 CONCLUSIONS	55
REFERENCES	

Executive Summary

This deliverable takes a cross-regional view of the processes through which small and medium-sized enterprises (SMEs) have become engaged in the DBE project. Its findings are based on fieldwork carried out with regional catalysts and potential SME drivers during project months 20 - 26. This was a significant time period as it marked the beginning of a programme of training and recruitment events that took place across each of the DBE regions. It also marked a period in which the first components of the DBE technology were released to SMEs. This set of circumstances created a distinctive opportunity for social science research. Whereas some of the other social science contributions to the DBE project have provided high-level, top-down socio-economic insights into the regional, business and IT environments in which SMEs operate, this deliverable was able to offer a ground-up view. In so doing, it captured the micro-detail of how 'first contact' between SMEs and the DBE project / technology was achieved and, subsequently, how (and if) the interest of individual SMEs was sustained. The purpose of this deliverable is not only to share these findings but also to provide a methodological argument for why engagement is an area of research that should be studied as it occurs 'in practice'. The purpose of this deliverable is to show how valuable data, insights and feedback on engagement can be gathered through the use of grounded research methods. The argument is made that practice and strategy should always be kept in an iterative relationship with one another through the balancing of strategic and grounded viewpoints.

The report begins by considering the theoretical implications of studying engagement. Two predominant ways of thinking about and designing methodologies for studying engagement are identified. The first is a managerialist approach that tends to over-emphasise strategic top-down control. The second stems from an academic research tradition of studying social and technical entities separately. In order to counter-balance these tendencies, empirically-driven, grounded methodologies for collecting and analysing data are advocated. A worked example, showing how theoretical concepts and fieldwork narratives are derived from raw data, is provided. The analytical concepts created are described in detail and then developed into an outline for a theory of engagement.

This deliverable is a social science research contribution, therefore it is concerned with providing both theoretical and practical outcomes. It proposes an empirically grounded theory of engagement based on the conceptual analysis of fieldwork texts. The research methodology and design used provides first-hand feedback from engagement and training events. It also engaged driver and potential driver SMEs in a process of feedback and consultation through semi-structured interviews. In addition to presenting, analysing and providing results from the data collected, this deliverable also reports on practical contributions that have been fed back to other tasks and sub-projects in order to assist and support the engagement process.

1 Introduction

1.1 Introduction

The purpose of this task is twofold: firstly, it is to understand the processes through which small and medium sized enterprises (SMEs) have become engaged in the Digital Business Ecosystem (DBE) project; and secondly it is to propose a workable methodology for studying these processes. The particular research focus taken in carrying out this task is to understand how engagement is achieved 'in practice', from the point of view of regional catalysts, SME Drivers and potential Drivers. It is argued that an empirically grounded 'in practice' approach to studying engagement provides a counterbalance to managerialist notions of strategy and top-down control. It is also argued that this approach is fundamental to overcoming theoretical divides brought about by research disciplines which tend to treat 'the technical' and 'the social' as separate phenomena.

This report is research-oriented rather than operational in character, i.e. its aim is not to evaluate whether or not recruitment targets or strategic aims have been met, but rather to capture the broader circumstances surrounding SME engagement. Through the structured analysis of the data collected, important insights and feedback are elicited which are used to describe the basis of a theory of engagement. The objective of theory development in any area of research is to take findings from specific research examples and render them generalisable. The aim of this report is to propose a basic framework for a theory of engagement which will allow findings from the DBE project to be generalised so that they can inform the work of other research projects. It is also intended that data gathered on early DBE engagement activities will provide insights for new regions who will be joining the project in Phase 2 (months 19-36). This is a particularly important area of data to capture since sustainable engagement beyond the funded research period has been an ongoing problem for European projects.

Whilst this deliverable represents a research contribution, opportunities to operationalise data collected were acted on. Feedback from engagement / training events and interviews with SMEs provided a rich source of data which was used to support training and induction (SP8 Training) and the development of the website, induction 'movie' and knowledge platform (SP7 Core DBE Services). Through listening to early reactions of SMEs to the DBE technology, initial concerns over intellectual property, data security and trust were fed back to SP10 Business Networks and Regulatory Frameworks. Finally, discussions about governance and the future of DBE beyond the end of the project generated some feedback on sustainability (SP11 Sustainability and regional policy) Further details of practical contributions are provided in Section 5.2.

This report suggests two theoretical approaches for studying engagement practices. Both these approaches are founded on the importance of empirically grounded research. The purpose of this deliverable is to show how valuable data, insights and feedback on engagement can be gathered through the use of grounded research methods. This kind of research makes particular demands on data collection and analysis and so corresponding methods for the grounded collection and analysis of data are described. A worked example of how 'raw' fieldwork experience is systematically developed into a conceptual framework that is described in detail with reference to specific examples taken from the DBE project. Finally, individual concepts and categories are combined to form the basis of a theory of engagement from which much of the contextual detail is removed in order to facilitate generalisability.

1.2 *Engagement practices and the DBE*

The focus of this deliverable is on engagement practices. 'Practices' in this sense is used in contrast to terms such as models, plans or strategies. In carrying out fieldwork for this deliverable, a broad understanding of what constitutes engagement was adopted. A formal benchmark of engagement can be taken as contractual commitment on the part of an SME, following a tendering or sub-contracting process. However, rather than focus on engagement procedure, this deliverable looks at the process of engaging SMEs as it was carried out by project partners, and experienced by SMEs. To achieve this, the researcher attended engagement events and carried out interviews in each of the 3 DBE regions. From 'first contact' to formal engagement, the aim is to describe how the interest of driver SMEs was captured and then sustained.

There are some distinctive aspects of engagement and the DBE project that need to be described. The process of engaging SMEs in the DBE project was originally termed 'recruitment'. This process was re-cast as 'engagement' after the 1st year, in order to suggest a process that goes beyond the purely procedural or operational. In effect, a number of formal, strategic DBE activities are associated with the engagement process including: induction, training, generating calls for tender and issuing contracts, as well as the development of web-based resources in the form of a website and knowledge platform. For example, the findings from this research were integrated directly into the knowledge platform design blueprint (D28.9). There are also a number of strategy documents defining targets and strategic approaches to both training (D28.1) and recruitment (D30.1). A further term, introduced after the annual review in January 2005, is sustainability. The term sustainability model was suggested in place of 'DBE business model' which was felt to hold limitations. Sustainability is, in effect, a longitudinal dimension of engagement and as such the two are inextricably linked.

The DBE strategy for SME engagement with its distinctive phased time-line and key regional roles is an important group resource for the DBE project and is described in detail in D30.1. It acts as a structural link between high-level business, computing and scientific efforts and the intended SME user. The

key regional roles identified include that of regional catalyst and regional influencer. Whilst regional catalysts are primarily responsible for the work of engaging SMEs, enlisting the support of regional influencers, such as respected university lecturers and local politicians, was also seen as key to the engagement process. The focus of early engagement efforts has been directed toward 3 regions: Tampere in Finland; the West Midlands in the UK; and Aragon in Spain. The aim was for each region to formally engage between 3-5 SMEs through a competitive call for sub-contracting during project months 18 and 19 (Apr-May 2005). Although all DBE regions are putting into place the same engagement strategy, the practice of engagement has varied in response to the differing circumstances which each region and regional catalyst faces. Understanding these regional variations provides an opportunity to consider a range of different approaches for engagement that may offer insights for future participants in the DBE and has been the topic of previous workpackages. For example, socio-economic analysis of strategic regional actors was carried out for D31.1 and the development of DBE fitness measures based on IT adoption rates and local industry for D9.1.

Studies that focus on SMEs and IT adoption in a generalised sense invariably run into problems of specificity. The varied and distinctive situations facing SMEs together with the range of technologies that form part of their business practices are far ranging. SME classification schema can provide a helpful way of contending with this diversity, as can tools for measuring IT adoption. However, at the stage this research was carried out, narrowing the field was not an issue. Having identified 3 target groups as part of its engagement strategy (Drivers, Users and Implementers), a significant shift in DBE engagement priorities was agreed by the project. Instead of focussing on recruiting user SMEs (those companies who would *use* services running on the DBE infrastructure) engagement efforts were focussed on driver SMEs (those companies who would *provide* services) and on influential regional actors such as policy makers. Therefore when SMEs are referred to in this report the companies in question are small European software houses involved in the development of business systems and services. The targets set for regional catalysts were to recruit 3-5 driver SMEs by the end of Phase 1 (month 18). All regional catalysts achieved this target so, in this sense, engagement in this phase of the DBE is deemed to have been successful.

Studying engagement in the context of an advanced research project offers its own distinct challenges. The concepts and entities with which user groups are asked to engage are in a process of development and can undergo dramatic change in relatively short spaces of time. Projects aimed specifically at technological innovation represent a distinct example of this and infrastructural technologies whose design and purpose only becomes clear when considered as part of a greater whole represent a particular challenge. Breaking down notions of 'the technology' being designed (in this case, 'the DBE technology') sufficiently to understand the dynamic role that different component parts play requires a measure of technical knowledge. That said, trying to study these components at a point when they have yet to achieve a stable form represents an even more difficult task.

When talking about engagement it is important to draw proper distinctions in order to understand 'what' is seeking engagement with 'what'. In the case of the DBE this means differentiating between:

- 'digital business ecosystem' - as a broader environment for business and the development of business services;
- the 'DBE technology' - which is a particular instance of the infrastructural technologies of which a digital business ecosystem is comprised;
- a 'DBE technical component' which is a specific element of that infrastructure;
- the 'DBE project' which is the funded body of researchers carrying out the project and includes various 'project instrumentation'.

Project instrumentation is a term used in this report to refer to those aspects of the DBE project constructed by project partners as a means of instrumentally shaping the course of events. They can be funding mechanisms such as tender or sub-contracting processes or contractual requirements. Alternatively they can be strategic instruments, such as the definition of recruitment target groups or the time phasing of a project.

Plans and strategies are important resources but they are also projections into the future; a rationalisation of future events based on current understanding. As an advanced research project, DBE strategy made considerable use of time-phasing and evolutionary metaphors to describe 'blocks' which would be incrementally filled with 'content'. This was particularly in evidence in the case of the training strategy and in the development of the knowledge platform. Whilst this is a commendable approach to planning, there needs to be a corresponding effort directed at precisely how these 'blocks' will be filled. This is typical of the issues that can arise when dealing with an area that has become the focus of concerted strategic effort.

For this reason it is argued that it is important to complement strategic understanding of engagement with an 'in practice' view of engagement that can capture the circumstances, decisions and critical success factors relevant to each regions' experience of enrolling SMEs. These factors are often subsumed into the day-to-day experience of those involved in engagement and have a corresponding tendency to get lost within accounts of engagement practice. Seemingly mundane questions concerning the timing of engagement events, the order of presentations or the presence of significant regional spokespeople can all play an important role in whether or not SMEs come away feeling they are ready to commit their valuable time and resources to finding out about the DBE.

Interviewing SMEs and regional catalysts gave important context to the analysis of engagement / training events and reinforced regional and SME-specific aspects of the data. Formally reflecting on engagement events beyond an evaluation of whether strategic aims had been met was frequently

not an option for regional catalysts whose energies were directed towards maintaining continuity and momentum rather than developing retrospective analyses. Capturing the process of engagement from achieving 'first contact' with SMEs to formal enrolment in the project therefore acts as an important resource offering insights that can support the ongoing engagement process within the DBE and the engagement process of other advanced research projects who find themselves in a similar position.

2 Theoretical issues with studying engagement

Introduction

This section describes two problems with studying engagement. The first problem is managerialism and the danger of an over-reliance on management tools such as plans, models and strategies. The second is an 'epistemic' problem relating to the way in which research disciplines approach the world. In order to address these problems, two theories are discussed which have the potential to shed light on how best to study engagement in the context of information infrastructures.

2.1 Two problems with studying engagement: managerialism and research tradition

'Managerialism' is a term used in organisational research to describe situations where strategic and managerial viewpoints have become entrenched¹. Associated with managerialism is an over-use of descriptions that are focused toward the production of plans, models or strategy². These tools are necessary and form an important part of organisational work. However, it is equally important that organisational work is seen from outside this framework and from perspectives other than that of management. One way of counterbalancing tendencies toward managerialism is to return to looking at phenomena as they take place 'in practice'. Studying things as they take place in practice means studying what takes place in context, 'in situ', in the everyday. It implies taking a 'ground-up', empirical view of events rather than a 'top-down' control based view. This is not to say that strategy and practice are unrelated. It is simply to make the almost common sense assumption that inevitably 'the plan' will differ from 'what actually happens'. The ideal is for strategy and practice to be locked together in a process of constant iteration and improvement. However, practice is often instrumentalised, evaluated purely in terms of whether strategic targets have been met, with the result that intelligence captured from seeing events from alternate vantage points is lost. The argument made in this report is that a rigorous, theoretically informed approach to studying and recording practice promotes understanding and enhances the outcomes achieved from operational and strategic goals.

¹ For example, Contu et al. (2003)

² Ciborra (2000)

The success of the DBE will lie in its ability to engage people outside the project in research outcomes, therefore engagement is of considerable strategic importance. Achieving a balance between strategic and 'in practice' perspectives on this issue is therefore all the more important. This is an area in which social science research can make a valuable contribution. However, research disciplines bring their own agendas to studying phenomena. Traditional research approaches tend to divide the world into the knowable and objective world of 'things' and the interpretable, subjective world of people³. Science and technology represent both process and outcome of the former and are therefore treated as 'matter of fact'. The social world is associated with phenomena often considered subjective, ambiguous and 'difficult-to-pin-down'. Social science schools of research have developed frameworks and methodologies for contending with these characteristics, just as scientists and technologists have methods for working with and producing stable facts. The resulting difficulty is that one form of research tends to preclude the other: either something is part of the irrefutable world of facts and therefore studied by scientists or engineers; or it is part of the human world, where in research terms, 'matters of concern' have the potential to place 'matters of fact' in contention⁴. Historically, this distinction has been described in a number of different ways such as the subject / object divide or the fact / value distinction⁵. Finding a way past these divides in order to create inclusive descriptions is a theoretical challenge.

2.2 Engagement practices

Studying engagement practices means looking at the everyday work that goes into contacting and developing relationships with potential SME partners. In particular, it means studying the *physicality of engagement*, where associations are sought 'on foot', 'in person', 'face-to-face'. Where momentum has to be studiously maintained in order to sustain interest, and a single follow-up e-mail is insufficient. It is the work of repeating, or 'routinising' contact with SMEs through one-to-one conversations, phone calls, e-mails and site visits all of which may need to take place a number of times before an invitation to attend a project 'talk' is accepted. Circumstances may prevent the invitee from attending, but if their schedule allows them time, there is also the chance that what they hear leaves them feeling disaffected or unsure of what is required of them. After reassurances, follow-up conversations and attending another talk, comes proposal preparation and submission, followed by selection and contracting processes, each of which requires further support and one-to-one attention. Given that other regions

³ For a thorough explanation of epistemological, ontological and methodological distinctions in the sciences and social sciences see Burrell & Morgan (1979)

⁴ The obvious sites where a clash between matters of fact and matters of concern can be seen are in the fields of medicine and biomedical research, and in the highly political arena of ecology. Issues such as genetically modified food and global warming are good examples of issues where there is a clear contest between facts and concerns.

⁵ 'Matters of concern', 'matters of fact' and the 'fact / value distinction' are all terms taken from Bruno Latour. For indicative references see Latour (1999) (2005).

involved have also reached this stage there will come a point where a cross-regional 'group' can be created. Perhaps this group will meet in person at an 'event' or perhaps they will interact through a discussion or coding forum. Ultimately, an inter-regional e-mail list of 'SME drivers' is created and at the touch of a button, routine communications are sent out to a nascent community.

What is missing from this picture, in the case of the DBE, is technology. Building a technical infrastructure is no less physically intensive, each piece of code, each component requiring hours of work before they can be compiled, 'run', woven together. Finding systems administrators who will allow computers to run without firewall protection and physically adding new computers to the network requires the same amount of skill and diplomacy that human introductions do. Somehow, a critical mass is achieved and components running software services across a peer-to-peer network that was so laborious to achieve are also set in motion through the press of a button.

From an academic research point of view, the inevitable question presents itself: do we study this as a human network of human interactions or as a network of technical components? For sociologists the answer is simple: this is a human network, a network of people which inevitably includes material resources which should be understood as tokens of social power and inequality. Economists see something similar, except instead of theorising about social systems and the way humans interact, they will theorise about how the resources, goods and services are exchanged. In their way, both of these disciplines are concerned with human agency. The 'non-humans' in the picture are 'symbols', 'material resources', 'tokens' that are pushed around by human actors. In order to bring technology to the forefront, it is necessary to turn to those disciplines who give precedence to the physical world such as computer science and engineering. In as much as the technical artefacts produced by these disciplines manifest scientific principles, there is also interest from the scientists, but by this stage, 'the social' has disappeared completely.

The problem of studying engagement in advanced technology projects is that there is a pressing need to understand networks as 'socio-technical' systems — comprised of both human and non-human (material/technical/symbolic) actors — where the answer to the question of whether social aspects or technical aspects (or both) should be placed in the forefront of the picture is empirical. However, having been the territory of separate research disciplines for so long, there are few methodologies and research approaches which can offer tools for studying both social and technical actors since, for most research disciplines, it is not appropriate to study humans as if they were technical components, nor is helpful simply to anthropomorphise technology.

In the following section, two theoretical approaches for studying engagement are described.

2.3 The ‘practice lens’ for studying technology

There are two common approaches to studying human-technology interaction. The first is to design a situation in which a person uses a piece of technology, where the technology, the person and what they will do is predetermined by the researcher (similar to a ‘user trial’). The other is to observe a person using a technology—that already forms part of their ordinary home or work environment—in ways that they would normally use it. According to the first approach, technical properties are ‘known in advance’ and assumptions about how those properties will be used and understood form the basis of the trial. In the second approach, nothing is assumed about how, or indeed if, a technology will be used. This has serious implications for how the technology itself is described. According to the latter approach, regardless of how complex and involved a programme, service or infrastructure may be, the question for the researcher is ‘how is it used?’. This approach has been called the ‘practice lens’⁶ and is based on a social theory called ‘structuration theory’⁷. According to this theory, rules, norms and conventions are not ‘given’, they are created through recurrent human action. Therefore any structure – from a system of roads to a software programme – is the outcome of a human process. As a result, the practice lens argues that technology should be understood in terms of how it is ‘realised’ in use. In other words:

technological properties may be examined to identify the typical or expected range of activities commonly associated with use of the technology. However, how these properties will actually be used in any instance is not inherent or predetermined; rather it depends on what people actually do with them in particular circumstances (Orlikowski 2000:409).

Orlikowski asserts practice, ‘everyday use’, as the basis upon which technological forms achieve substance. Similar to structuration theory, the practice lens aims to create frameworks that assert the significance of human agency over technology. In asserting the role of human agencies these theories draw the possibility of agency away from *the technology itself* and attribute it to designers and users. In so doing they render technology malleable, ‘open’ to design and re-design by humans.

However, from a technology point of view, the question of *how open* a technology actually is to re-design is one that cannot be ignored. Whilst it is important that the user perspective as to what a technology is should remain central, pressing concerns about how the practice lens approach can assist in the study of inherent inequalities that are present in the construction of technologies and technological infrastructure remain. These concerns are

⁶ Wanda Orlikowski (2000)

⁷ Anthony Giddens (1984)

taken up by actor-network theorists and the alternative picture presented by this theory is described below.

2.4 Actor-Network Theory

The basic assumptions made by structuration theory and the practice lens are contested by authors who subscribe to actor-network theory⁸. They argue that the assumptions these theories make are founded upon insistence on a fundamental division between humans and the objective, natural world. The result of this division is that a power dynamic is created where, according to social theory, *either* humans dominate the objective world or the objective world dominates people. This is the equivalent of saying either humans create and therefore control social structures or that social structures control what people do. Actor-network theorists understand this premise as an *a priori* attribution of agency (and by consequence passivity) and argue that the implicit attribution of agency to some actors and not others should be a question which is referred to empirical analysis not theoretical assumption.

To illustrate his point Latour⁹ uses the example of a slogan used by anti-gun lobbyists, 'Guns kill people' compared to the slogan used by pro-gun groups 'Guns don't kill people, people kill people'. Latour argues that polarising debate around fixed ideas concerning the relationship of humans and objects detracts from what he sees as most important, namely, how these relationships are enacted in a given situation. In this way, agency is placed at the centre of the picture and the potential to act is opened out to human and 'non-human' actors. An important characteristic of agency is that it includes the capacity of actors to enrol one another in a network of relations. Therefore, according to actor-network theory, it is possible for a non-human or technical actor to enrol other actors into a network of relations. This places the whole concept of (human) intentionality in question and opens up processes of technical design to 'the unintended'.

The concept of enrolment has been used in recent writing on information infrastructure¹⁰. The basic position adopted by these authors is that the relations that information infrastructures enact are dense and diffuse and that knowledge of any infrastructure as a 'totality' is virtually impossible. With the likelihood of over-arching control taken away, infrastructure becomes something that is always locally achieved through the textured 'knitting together' of practices. The term 'ecology' is commonly used with reference to infrastructure to depict the inherent heterogeneity and complex interconnectedness of information infrastructures. An important characteristic of infrastructure has been identified as its tendency to 'fade into the

⁸ Actor-network theory is attributed to Callon (1986) Latour, (1987) although other authors are closely associated with the theory's development such as Susan Leigh Star (1991) and John Law (1991).

⁹ Latour (1999), page 176

¹⁰ For examples see: Ciborra, 2002; Hanseth & Braa, 2000; Star & Ruhleder, 1996; Bowker & Star, 2000

background' except at times of breakdown. For example, only when a light bulb does not come on at the flick of a switch is the infrastructure for providing electricity taken into consideration. One way these authors suggest for making sure that the significance of infrastructure is not lost, is to focus on interconnections between individual actors – both human and technical – that allow the infrastructure to function. Another approach is to focus on the standards that allow those interconnections to take place, such as, for example, the various standard sizes for light bulbs.

Keeping in mind the effort that goes into creating a standard keeps in mind the work involved in creating and sustaining an infrastructure. The historical contingencies involved in classifying complex phenomena 'one way' reveal the 'work' that classification entails. Part of this work is the work of enrolment, the work of gathering people and resources together under a common banner. However, weight of numbers is not the only force at play. An alignment between the aims of human and technical actors can create a powerful network. Technology lends substance or durability to a network of actors and there is the potential for 'lock-in' or irreversibility. In order to draw these aspects of information infrastructure to the forefront, actor-network theorists argue for a focus on the classifications, standards and categories upon which the interconnectivity of infrastructure depends. Correspondingly, they suggest a focus on the spaces between categories and classifications (the unclassifiable, that which is outside categorisation) as a basis for understanding how interconnectivity is locally achieved and what the historical conditions for that interconnectivity are.

The implication of these distinctions for studying engagement is that engagement becomes the study of how associations, links, joins and binding associations are formed between people and resources. In complex processes of network building and group formation it is therefore useful to set aside traditional theoretical distinctions and allow qualities and attributes to remain empirical. In this way, if a technical component is described as 'messy and unpredictable' and a person described as 'accurate and reliable' the veracity of these descriptions is tested against whether this appears to be the case in practice or whether events and consensus of opinion suggest otherwise.

3 Research methodologies for studying engagement

3.1 Introduction

The practice lens and actor-network theory provide an interesting basis for thinking about how to design studies of engagement. Both theories advocate an empirically-grounded approach to studying socio-technical networks as a means of overcoming predominant mindsets. Other research approaches that could also offer interesting insights are critical theory, which takes an explicitly political view of social interactions and action research, where the researcher participates directly in the work taking place. However, in the case of DBE engagement, both these approaches were rejected: the former on the

grounds that the researcher was too embedded in DBE project dynamics to provide a rigorous political examination of them; and the latter because a clear differentiation between providing operational and research based outputs was sought in this deliverable. The goal of action researchers is to actively intervene in a project and influence strategic outcomes whereas the goal of this report was to prioritise practice. This was deemed necessary due to the already strong strategic emphasis on engagement within the project.

It is argued here that longitudinal, qualitative research methods are best suited to the study of SME engagement particularly where a process of technical design is in progress. When the practice lens is applied to social studies of technology innovation, the researcher can find themselves in the unsettling position of beginning their study without a defined social group or specific technology to focus on. Instead they are required to 'watch this space' where 'the space' is a likely site of engagement between a new technology and its users. A likely site is determined through thorough background research and through developing a familiarity with those involved in the innovation process.

This lack of known quantities makes the application of quantitative research methods difficult since they are largely, if not wholly, dependent on developing measures. In the case of technical innovation the question of 'what to measure' presents some difficulties in this regard. Timing is an important consideration in the design of technology innovation and engagement studies, since for much of the time technical components are in the process of design and users are non-existent. DBE researchers responsible for designing interviews prior to this research were faced with exactly this problem. They had to speculate as to who users might be and take a top-down view of who might constitute a 'regional influencer'. Being further removed from 'actual' engagement, these research designs were at the mercy of changes in strategic thinking. This is true of work carried out for D7.1 User profiling, D9.1 Model of Fitness Landscape and D31.1 Regional Catalysts.

3.2 Designing practice-based fieldwork

An issue faced by anyone involved in a process of technology innovation is that interest in the technology in question has to be generated before technical components are physically available for inspection. In the dissemination of new technologies, potential users are commonly asked to engage with a concept, an idea of what a new technology is capable of before they can see for themselves¹¹. The period in time that this research refers to is a distinctive one because it depicts a period of transition where engagement in the DBE as a technical entity went from being purely conceptual to something tangible. Following the advice of infrastructure authors, it is important to look closely at the exact points at which actors—both technical and human—come into contact with one another. For some

¹¹ Swanson (2002)

this contact will recur and eventually develop into a relationship of some kind. For others it will end at some point before this. In some respects, this can be described as the micro-detail of engagement. However, actor-network theory makes no prior assumptions based on size, scale or longevity. In this sense, it is not simply status or weight of numbers that influences why a particular preference or point of view is significant. It can be the part that point of view plays in a process or chain of events. For example, the first contact any SME had with a DBE technical component was a significant test of credibility for the project and those involved in it, therefore, the opinions and feedback offered at that time were important, even though they concerned just one SME. From a practice lens point of view, impressions of the technology gained at this moment represent the true test of technical properties.

According to actor-network theory, likely sites of engagement between users and new technologies are not as difficult to pinpoint as one might imagine. The work that goes into processes of group formation and enrolment is almost always conspicuous, as it not only involves people but also material and symbolic resources. Developing interests and associations together with amassing resources lends substance to the process of enrolment and creates opportunities for the values and objectives of the group to be inscribed. In the case of the DBE, an important form of this kind of opportunity was created through the programming of engagement and training events. These events marked important moments in time when project machinery, technical components and SMEs were brought together for the first time. Through the support of dedicated regional catalysts, consequent events helped to construct a sense of group as familiar faces were seen again. The practice perspective asks that we understand these events as unfolding and as important points in time where common values and objectives are formulated is an emergent and collective process.

Unlike practice lens, actor-network theory is not attached to any 'higher theory' about 'society'. It is solely focused on empirical circumstance and does not offer any explanation for 'why' events took place the way they did. As far as possible, emphasis is placed on taking a purely descriptive approach to data collection. In this way the individual circumstances of a particular decision are left undisturbed. The advantage of aiming to capture the individual circumstances through which engagement is achieved is that the reasons formulated by SMEs for joining or becoming interested in the DBE are left intact – however idiosyncratic or distinctive they seem - and not substituted by an over-arching idea of why they should take part. Since SMEs are ultimately the project's primary audience, capturing this point of view is important if the project is to successfully communicate its aims to attendant regions and make the shift from 'project' to nascent community.

3.3 Grounded research methods – analysing fieldwork data

Grounded research methods and in particular grounded analysis is an empirically driven method for developing generalisable theory from fieldwork

data. 'Empirically-driven', in this sense, means that in seeking to arrive at salient conclusions regarding fieldwork events, priority is given to the way research participants see a situation and the way events unfolded 'in practice'. A particularly rigorous form of grounded analysis is provided by a theory called grounded theory, originally developed by Anselm Strauss and Barry Glaser¹² and later modified by Strauss and Corbin¹³. Grounded theory analysis can only be carried out with 'raw data', which can be interview transcripts of fieldwork descriptions, which, as far as possible, have not been shaped or influenced, by a particularly rigid or structured theoretical approach or single point of view. The data collected from fieldwork activities is left 'as it is' and quantitative methods that restructure texts are not advocated. The authors of grounded theory accept that an important role of research is that it should build on the findings from previous studies and be able to take into account current and historical debate on a particular topic. Therefore in keeping with most other research methodologies including those taken from scientific traditions, a literature review or theoretical discussion in which alternative points of view are considered is an essential aspect of research design.

Integrating ideas from theoretical discussions or literature reviews into data collection activities can be achieved through the design of interview questions. In this way, the relevance of ideas and arguments that figure prominently within current research topics and debates can be 'tested' against an empirical situation. In the case of the DBE project or, in fact any large research project for that matter, it is also relevant to take into account debates and points of interests that emerge from project interactions. These debates are a synthesis of the specific challenges and opportunities currently confronting those working on the issues in question and are therefore an invaluable source of insight. For this reason, the full index of fieldwork documents for this research includes notes from project meetings and interactions.

It is not uncommon for issues that are raised within research circles and concerns that present themselves within the project to coincide. The issue of DBE governance is an example of such an issue. On identifying governance as both a concern of the project and a research issue, questions on this topic were included in the interview design. However, during the process of analysis it is important to bear in mind what has 'come from' the research situation as experienced by the interviewee and what has been consciously 'inserted' by the researcher. For example, the fact that governance was frequently spoken about by interviewees could have potentially more to do with the fact that it was a recurrent question than that it was at the forefront of interviewee's minds. However, this does not invalidate these responses. Whilst these issues can be structured into interview questions it cannot be assumed that interviewees will see the relevance of such questions; they may dismiss a question entirely, choose not to reply or else simply 'draw a blank'

¹³ Strauss and Corbin (1998)

and feel no need to elaborate on a particular answer. The answer to the question of whether governance is an important issue from the point of view of SMEs wishing to take part in the DBE remains empirical.

Grounded theory provides guidelines to support the systematic development of *concepts* and over-arching *categories* from raw fieldwork data. Theoretical findings are important because they form the vehicle through which research results can be generalised and consequently discussed in relation to other research findings. Through a thorough discussion of what standpoint has been adopted and what methods have been used, the differences between research results taken from different studies can be considered in relation to one another. Grounded theory also offers support in constructing a narrative version of the events described by research participants. These narratives need not necessarily be derived directly from interview participants 'telling the story' of how a particular set of circumstances came about. They can also refer to a sequence of events. As grounded theory analysis places emphasis on retaining the original meaning and order of events as they occur this opens out 'events' as raw data which can be mined for concepts. The methodology for data collection adopted here includes both events and interviews which when combined with this analytical technique, means that timing, organisation and structure of events can be understood as significant.

3.4 Data collection

The process through which data was collected for this research involved being a participant / observer at engagement workshops and meetings across the three DBE regions. This fieldwork activity was supported by a programme of interviews with regional catalysts and both actual *and* potential SME drivers. This last point is important because it is important to understand why SMEs lose interest as well as their motivations for becoming involved. By enriching understanding of non-engagement it also becomes possible to develop ways of reaching SMEs who express no interest in the DBE whatsoever.

This approach is complementary to the 'balanced scorecard'¹⁴ technique also being used within the project to compare and understand the pivotal role of regional catalysts in each of the regions. Whereas balanced scorecard and other similar approaches offer a broad classification of organisational priorities and significant relationships, a grounded approach describes these priorities as they emerge 'in practice'. In this way, that which wasn't predicted or which doesn't appear to be a necessarily strategic or rational way to act can also be captured and understood as part of engagement practice. The data collected also bridged a gap between current events and prior DBE interviews that took place. Previous interviews took high-level views that looked at types of influential socio-economic networks or open source development. Coming

¹⁴ Kaplan and Norton (1996)

from the 'ground-up', means this research can complement findings from those deliverables.

Communication within an integrated project such as DBE is a distinct issue. Differing organisational and disciplinary standpoints have to be acknowledged but ultimately the message being communicated to SMEs has to be both convincing and coherent. By listening to the questions asked by SMEs at engagement events, by looking closely at the points they interrupt a presentation and re-focus the discussion and by paying close attention to the concerns they express a better understanding of the SME standpoint can be established. From a broader research point of view there are many important questions here about how people are involved in processes of innovation where the technology in question has yet to achieve a stable form. From the perspective of achieving critical mass within the DBE it will be important to absorb and disseminate the lessons learnt in this stage of engagement in order to promote engagement in other regions. The shift from 'project' to 'community' will become increasingly important within this process as SMEs begin to seek ownership of the technology.

The beginning of fieldwork was timed to coincide with the first in a programme of training / engagement events which took place in Finland in February 2005. Whilst there were still no technical components of the DBE to show SMEs, this workshop was designed to focus specifically on the technical concepts and architecture of the DBE. Following this event, the researcher attended every training or recruitment event that took place from this point until mid-June 2005. Table 3.1 below provides details of the engagement events attended.

Table 3.1 Diary of Engagement Events

Date	Event	Text
22.02.05	Tampere Technology Workshop	Unable to attend
23.02.05		<ul style="list-style-type: none"> • Workshop documents
18.03.05	SME Recruitment Event – West Midlands	Attended <ul style="list-style-type: none"> • Meeting Notes
05.05.05	Technology Workshop – West Midlands	Attended <ul style="list-style-type: none"> • Meeting Notes
11.05.05	Pre-tender meeting – Aragon	Attended <ul style="list-style-type: none"> • Meeting Notes
14.05.05	Coding Workshop – Tampere	Attended
15.05.05		<ul style="list-style-type: none"> • Meeting Notes

26.07.05	Individual Technology Training – West Midlands	Unable to attend • E-mail feedback
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Continuous attendance of engagement events allowed the researcher to develop a cross-regional understanding of how engagement was taking place in each region. It also allowed the researcher to get to know driver and potential driver SMEs inter-regionally, as a group which, ideally, in engagement terms they would soon become. From a theoretical point of view it was important to attend events as well as carry out interviews because the interactions that took place in events were not structured by the researcher in the way that interview questions are. The questions, discussions and reactions that formed part of engagement events were spontaneous and unplanned. Lines of enquiry took directions and inspired ways of seeing things that had not previously been thought of. In this sense, they therefore revealed more about the status of both project-based SME understanding of the DBE technology than semi-structured interviews did (although these too could take unexpected turns). The practice lens also places the design, programming and content of engagement events themselves under scrutiny. Seen as a means through which context-specific understanding of local SMEs was expressed, choices made regarding engagement events are seen as an important area of analysis in themselves.

In addition to the attendance of engagement events, a programme of interviews was scheduled on behalf of the researcher by regional catalysts. Whilst in the West Midlands interviews took place with driver SMEs only, in Tampere regional catalysts felt it was important that the researcher also speak to companies who had opted not to become involved with the project at that stage, and in Aragon a local politician and an academic were included. Retaining the emphases that emerged in each region, rather than seeking identical sets, was important to the practice approach taken. It should also be noted that the SMEs interviewed do not constitute a representative sample of, for example, open source companies or even SMEs. However, an arguably stronger basis for their selection exists in the form of the empirical relationships these companies had with the DBE. Table 3.2 below provides details of the interviews carried out.

Table 3.2 SME engagement interviews and associated documents

Date	Interview	Files and Documents
17.03.05	Interviews West Midlands Regional Catalysts 1. SME Business Consultant 2. Interview Aragon Regional Catalysts	• Recording • Recording
11.05.05	[Pre-tender meeting – Aragon]	

	Interview 3. Professor of Economics – University of Zaragoza	<ul style="list-style-type: none"> • Notes • Interview guide
12.05.05	Interviews – Aragon 4. Local Politician 5. Interview Aragon Regional Catalysts 6. Driver SME Aragon 1 7. Driver SME Aragon 2	<ul style="list-style-type: none"> • Notes • Notes • Interview guide • Recording • Recording • SME interview guide • Company Brochures
02.05.05	Tampere Interviews 8. SME Tampere 1 9. Meeting with Regional Catalysts 10. SME Tampere 2 11. SME Tampere 3	<ul style="list-style-type: none"> • Recording • Recording • Recording • Recording • SME interview guide
03.05.05	12. SME Tampere 4 13. SME Tampere 5 14. SME Tampere 6	<ul style="list-style-type: none"> • Recording • Recording • Recording
July 2005	West Midland Interviews 15. SME West Midlands 1 16. SME West Midlands 2 17. SME West Midlands 3	<ul style="list-style-type: none"> • Recording • Recording • Recording

The product of each fieldwork activity is a text—such as an interview transcript or meeting notes—which is then submitted to a process of analysis. Retaining the grounded character of research findings is something that depends as much upon the methodology applied to data analysis as it does to the way in which data is collected. For this reason, the next section provides a ‘worked example’ of data analysis in order to demonstrate how analytical concepts are developed from fieldwork texts.

4 Using grounded methods to carry out engagement research: a worked example

4.1 Introduction

In the previous section, the processes associated with designing research and collecting data using grounded methods were described, as was the process of data analysis. This section looks in detail at the process of analysis. Taking a set of meeting notes from an engagement event that took place in one of the DBE regions, a narrative was developed which 'tells the story' of the meeting. Within grounded theory analyses, this process is known as selective coding. It is designed to help the researcher integrate and refine the concepts which have emerged from this and other primary texts. An awareness of the other concepts or 'storylines' in research texts allows the researcher to group individual 'instances' or examples into 'categories'. Eventually, individual instances will form dimensions and properties associated with the category. For example, one of the categories developed from DBE data on engagement was 'regional perspectives' and within this the concept of 'markers of credibility' was shown to be significant. However, what constituted a credibility marker differed across each region; in Tampere university involvement lent credibility to the project but the involvement of local politicians detracted from it, whilst in Aragon, precisely the reverse was true. In this way, credibility markers form a dimension of regional perspectives and, in this instance, the attributes of 'lending to' or 'detracting from' credibility are properties of local politicians and universities.

4.2 Fieldwork narrative

The following is an excerpt from a fieldwork narrative written as part of a process of selective coding. The narrative was derived from an original fieldwork account of events that was recorded in the form of meeting notes and fieldwork diary entries.

Coding Workshop, Tampere, 14.05.05 - 15.06.05

The Tampere Regional Catalysts decided to schedule a 'coding workshop' for potential SME drivers on 14th and 15th June 2005. The Tampere Regional Catalysts had been under pressure from the SMEs they had engaged. As was the case in the other two DBE regions, having been introduced to the concept of the DBE, the SMEs wanted to see the technology in question. They argued that they couldn't start thinking about how a new technology could be used in relation to their own products, customers or software expertise unless they were given the chance to 'look under the hood'. In Tampere, however, there was another dimension to this desire for direct experience of the technology. Open source values were very apparent among the Finnish SMEs (possibly due to regional characteristics, possibly due to the recruitment strategy). For them, it was problematic that the project had expressed open source affiliations whilst continuing to work 'in secret'. The 'closed' organisational practices of the DBE as a project were as troubling

as the lack of access to DBE source code of any kind. The Tampere regional catalysts wanted to overcome this barrier and reassure SMEs on these issues as soon as possible. To them, the next stage in organising training / engagement activities and fostering the right conditions for trust was to enable the SMEs to work directly with those component parts of the DBE technology that were available.

The coding workshop was scheduled to take place over 2 days. The timing of the workshop came approximately 1 month after the first 2 components of DBE technology had been released. These were the FADA 'cloud' and the Servent.¹⁵ Both of these components are significant to the distributed, peer-to-peer nature through which the DBE technology will operate. Being able to see how technologies were able to communicate via these components was therefore a highly significant test of how the DBE infrastructure and technical components would be compiled.

The workshop was held at the Technology University in Hermia. There were 7 representatives in attendance from 5 SMEs although, as can be expected from companies who have small employee numbers, not all 7 representatives could attend the whole workshop and it was accepted that mobile phones would be left on in order for participants to accept business calls. In addition, sensitivity to start and finish times was maintained and the amount of time spent on each part of the day was negotiated. The workshop was being run by two representatives – Carlos and Tim – who were DBE project partners working for a small Spanish SME who had been carrying out work on the DBE technology in conjunction with Sun Microsystems. The DBE technical director had hand-picked Carlos and Tim – in particular Tim - because, 'he won't wear a suit and he'll sit on the floor'.

On the first day a significant amount of time had been spent setting up computers and establishing a network connection. It had been discussed and agreed that participants would bring their own computers since they could navigate these much quicker. Once a connection was established, workshop participants set themselves a simple task. Using the Servent, the workshop participants had established a connection between two of the computers, via the FADA cloud and one had managed to capture the date from the other's computer. This was a deliberately simple test which in itself achieved little. What was important was the learning process and the fact that ultimately, it worked. One of the participants described it as the network equivalent of the 'Hello World' programme used in the first stages of most programming courses

Day 2

Everyone had been for a beer the night before so the meeting started slowly. I was asked to begin the meeting by providing feedback from the DBE General Meeting. I had taken the transcripts from the interviews I had been carrying out with SMEs and presented them at the General Meeting in the

¹⁵ <http://sourceforge.net/projects/fada> and <http://sourceforge.net/projects/swallow>

sessions on regional updates, training and open source. Some landmark decisions were taken at the General Meeting, to make the project more open and to release the code that project partners had been working on into an open source environment. We discussed questions that had come up at the General meeting about governance and talked about examples of what SMEs were doing in the other regions, about which there was a natural curiosity. We also discussed the question of continued research and the fact that the SMEs would be contacted by other researchers from the project seeking interviews with them. The problem of SMEs forming part of a research 'tourist trail' was discussed along with fears that knowledge would not be shared sufficiently within the project and the same questions would be asked over and over again. These concerns were noted and again, plans were discussed from the General Meeting to create a forum within the DBE knowledge platform where interview schedules and data could be shared and could be brought up for discussion.

A noteworthy characteristic of this workshop was that it lacked many of the formal characteristics associated with training programmes. There was no agenda, no detailed workshop timetable and the focus and agenda of the session appeared to be set and negotiated by the group as they went along. This appeared to be a consequence of the kind of workshop leadership offered by Carlos and Tim who showed a deliberate disregard for didactic teaching techniques and who treated the entire workshop as a collaborative, co-learning experience rather than a knowledge dissemination exercise. Whilst, for me, coming from an academic background, this was quite an unfamiliar style of communicating, workshop participants seemed to be entirely at home with it.

The lack of agenda was apparent once I had finished my report about the General Meeting which had been scheduled as the first item of the day. After I sat down there was an unnerving (to me) silence where nobody appeared about to take the floor. I looked at Carlos and Tim but they did not look as though they were about to speak. After some time where everyone appeared to be simply looking at their laptops, one of the SME representatives, Timo, suggested that perhaps we could talk through a potential application case. There was a generalised, non-verbal consensus that this might be a good way to proceed and then some more (not uncomfortable) silence. Eventually Timo suggested that he could discuss a case that his firm had been thinking of. He checked with the group that they would be interested in working on his example and the rest of the group nodded or at least didn't object or raise an alternative. Timo walked to the front of the room, picked up some chalk and began working on the blackboard, trying to describe the application his company has been working on. The case involved a migratory service which involved taking data from one CRM system and making it available to another CRM system without using traditional data import / export methods. Instead of data 'travelling' from one system to another Timo described the application as allowing access to data which remained static within the respective systems' repositories.

As he described the software project he drew on the board and the other participants stopped him to ask questions and request clarifications. Once they all felt they understood what the piece of software Timo described was about, there was another pause. Timo sat back down in his seat. To the participants, the next stage seemed obvious (although personally, I had no idea where this was heading): they must now try and code the piece of software. At this juncture some energy came into the room. There was some laughter and jokes. Timo put the question to the group - 'who would like to code this?'. There was a laptop at the front of the room hooked up to a data projector and he gestured to the chair in front of it. He opened up a Java coding session which appeared on the screen at the front of the room. There is a light-hearted sense that someone will need to give a performance and a low-level competitiveness as to who is going to take the chair. Jan makes a comic gesture where he clasps his hands together and stretches out his fingers like a concert pianist preparing to play. Luca laughs at him and makes a gesture of blowing on his fingertips and rubbing his hands together. Another participant rolls his shoulders and moves his neck from side-to-side, like a boxer limbering up. After all this, they agree that in fact Timo should continue as he has the best understanding of the project. He sits down and begins to code whilst the rest of the workshop participants shout out suggestions, questions and raise points for discussion. By the end of this 'multi-programming session' a huge amount of technical detail has been discussed and there is quiet yet palpable admiration for Timo's coding ability.

4.2 Generating concepts and core categories

In the example above, a fieldwork document which aimed to take an 'in practice' view of a fieldwork event was submitted to a process of open coding, according to the principles of grounded theory. The process of open coding allowed the copious amounts of raw fieldwork (that is often generated through this research approach) to be translated into a number of summative concepts. These concepts were placed in conjunction with one another and finally submitted to a process of selective coding. The outcome of selective coding was the narrative provided above.

In the following section, this narrative is set within a table. The concepts derived from the original fieldwork text are placed alongside it. In this way, the reader can see for themselves how the concepts were arrived at. The aim of showing this 'worked example' is to bring greater transparency to the process of analysis. Obviously, the process of open and selective coding was carried out for all the fieldwork texts and materials collected throughout the fieldwork period.

The concepts listed in the table and discussed in the following section were ones that recurred throughout the process of analysis. Through systematically drawing on all the individual narratives constructed, an over-arching narrative of the whole engagement process was written. This led to the development of an over-arching category – what is known as a core

category. This core category was labelled ‘credibility and attunement in SME engagement’ and is described in detail in Section 6.

<p>Coding Workshop, Tampere, 14.05.05 - 15.06.05</p>	<p>Concepts</p>
<p>The Tampere Regional Catalysts decided to schedule a ‘coding workshop’ for potential SME drivers in June 2005. The Tampere Regional Catalysts had been under pressure from the SMEs they had engaged.</p> <p>As in the other two regions, having been introduced to the concept of the DBE, the SMEs wanted to see the technology in question. They argued that they couldn’t start thinking about how a new technology could be used in relation to their own products, customers or software expertise unless they were given the chance to ‘look under the hood’.</p> <p>In Tampere, however, there was another dimension to this desire for direct experience of the technology. Open source values were very apparent among the Finnish SMEs (possibly due to regional characteristics, possibly due to the recruitment strategy). For them, it was an issue that it was equally problematic that the project had expressed open source affiliations whilst continuing to work ‘in secret’. The ‘closed’ organisational practices of the DBE as a project was as troubling as the lack of access to the</p>	<p>From first contact to engagement – the content of the ‘next’ training / engagement event tended to emerge or clarify as events progressed based on the situated reckoning of the RCs. Tampere tended to take the lead with the other two regions drawing upon their experience to design their own events.</p> <p>Engaging with technology innovation – a recurrent theme throughout engagement events was the need to see the technology first.</p> <p>From project to community – this issue was indicative of the challenge that SMEs made to DBE project participants. Not all SMEs were sensitised to issues surrounding open source, but for those that were, these were extremely important credibility issues and a condition of trust depended. Both the nature of open source software development and associated organisational practice were at stake.</p>

<p>DBE technology. The Tampere RCs wanted to overcome this barrier and reassure SMEs as soon as possible. To them the next stage in organising training / engagement activities and foster the right conditions for trust was to enable the SMEs to work directly with those component parts of the DBE technology that were available.</p> <p>The coding workshop was scheduled to take place over 2 days. The timing of the workshop came approximately 1 month after the first 2 components of DBE technology had been released. These were the FADA cloud and the Servent.</p> <p>Both of these components are significant to the distributed, peer-to-peer nature through which the technology will operate. Being able to see how technologies were able to communicate via these components was therefore a highly significant test of how the DBE architecture and technical components themselves would be compiled.</p> <p>The workshop was held at the Technology University in Hermia.</p> <p>There were 7 representatives in attendance from 5 SMEs although, as can be expected from companies who have small employee numbers, not all</p>	<p>From first contact to engagement - this was a critically important point in the engagement process as it marked the first time that the DBE technology had been formally presented to SMEs. Although technical partners within the regions had experimented with FADA and the Servent when they were first released, this was the project's first attempt to show the technology SMEs.</p> <p>Engaging with technology innovation – prior to the availability of technical components that SMEs could see, many of those who remained interested in the project were drawn to the architecture and architectural principles that the DBE technology embodied rather than higher level concepts of the DBE</p> <p>Regional perspectives – the status of universities in each region differed. In the case of Tampere, the involvement of the university lent credibility to the project but the presence of local politicians would have deterred SMEs. In Aragon, exactly the opposite was true.</p> <p>SME perspective – communicating an understanding of the day-to-day reality of SMEs was a key aspect communicating</p>
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<p>7 representatives could attend at all times and it was accepted that mobile phones would be left on in order for participants to accept business calls.</p> <p>In addition, sensitivity to start and finish times was maintained and the amount of time spent on each part of the day was negotiated.</p> <p>The workshop was being run by two representatives – Carlos and Tim – who were DBE project partners working for a small Spanish SME who had been carrying out work with Sun Microsystems on the DBE technology. The DBE technical director had hand-picked Carlos and Tim – in particular Tim - because, ‘he won’t wear a suit and he’ll sit on the floor’.</p> <p>On the first day a significant amount of time had been spent setting up computers and establishing a network connection. It had been discussed and agreed that participants would bring their own computers since they could navigate these much quicker. Once a connection was established, workshop participants set themselves a simple task. Using the Servent, the workshop participants had established a connection between two of the computers, via the FADA cloud and one had managed to capture the date from the other’s computer. This was a deliberately simple test which in itself achieved nothing. What was important was the learning process and the fact that ultimately, it worked. One of the participants described it as the network equivalent of a ‘Hello World’ test used in software development methodologies.</p>	<p>concern and a sense of shared values.</p> <p>From first contact to engagement / SME perspective – sensitivity to timings were also key and helped to communicate respect.</p> <p>From first contact to engagement / SME perspective – in designing the coding workshop, the Regional Catalysts and the technical director picked workshop leaders who would embody similar values to the SMEs they were dealing with. Promoting this kind of identification was a key aspect of gaining trust and credibility.</p> <p>Engaging with technology innovation / From first contact to engagement – it should be remembered that at this stage in the project no demonstration of DBE components existed and there was certainly no ‘training handbook’. To have a formal training model training when the technology was at such an early stage and which had been designed at a distance from the SME audience it would be written for would have been a mistake. In this case we see the emergent nature of training and how the form it took instinctively absorbed the values, concerns, priorities and most importantly software practices and methodologies that SMEs used. They learnt together in a collaborative environment very similar to the environment created within open source development environments.</p>
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<p>Day 2</p> <p>Everyone had been for a beer the night before so the meeting started slowly. I was asked to begin the meeting by providing feedback from the DBE General Meeting. I had taken the transcripts from the interviews I had been carrying out with SMEs and presented them at the sessions on regional updates, training and open source. Some landmark decisions were taken at the General Meeting, to make the project more open and to release the code that project partners had been working on into an open source environment. In sharing the views of SMEs with the General Meeting on these topics they were given a voice at the (still closed) project meeting and decisions regarding open organisational practice and software development methods were placed in the spotlight.</p> <p>We discussed questions that had come up at the General meeting about governance and talked about examples of what SMEs were doing in the other regions. There was natural curiosity about this whilst talking about the other regions also created a wider sense of group and community. We also discussed the question of continued research and the fact that the SMEs would be contacted by other researchers from the project seeking interviews with them.</p> <p>The problem of SMEs forming part of a research 'tourist trail' was discussed along with fears that knowledge would not be shared sufficiently within the project and the same questions would be asked over and over. These concerns were noted and again, plans discussed at the General Meeting to</p>	<p>From project to community – there had been a certain amount of frustration among some of the more open source oriented SMEs that the project was still so 'closed' both organisationally and in its approach to software development. This viewpoint which had been captured during interviews for this task was captured and fed-back. Providing feedback channels from engagement activities formed a crucial aspect of, creating reassurance that SMEs were being listened to at a time when there were still, in effect, being excluded from project development and decision-making.</p> <p>From research project to community – crucial aspects of governance were raised in this discussion. The appointment of authority in communities which aim to be essentially non-hierarchical is a highly sensitive issue. There were also pragmatic and extremely pressing concerns over who how issues relating to trust, identity and data security would be decided on and overseen within the DBE technology and community.</p> <p>From research project to community – demonstrating appropriate respect SME participants' time through ensuring strong inter-project communication was a key concern.</p>
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<p>create a forum within the DBE knowledge platform where interview schedules and data could be shared were brought up for discussion.</p> <p>A noteworthy characteristic of this workshop was that it lacked many of the formal characteristics associated with training programmes. There was no agenda, no detailed workshop timetable and the focus and agenda of the session appeared to be being set and negotiated by the group as they went along. This appeared to be a deliberate result of the kind of workshop leadership offered by Carlos and Tim who showed a conscious disregard for didactic teaching techniques and who treated the entire workshop as a collaborative, co-learning experience rather than a knowledge dissemination exercise. Whilst, coming from an academic background this was quite an unfamiliar style of communicating to me, workshop participants seemed to be entirely at home with it.</p> <p>The lack of agenda became apparent after my report which had been scheduled as the first item of the day. After I sat down there was an unnerving (to me) silence where nobody appeared about to take the floor. I looked at Carlos and Tim but they did not look as though they were about to speak. After some time where everyone appeared to be simply looking at their laptops, one of the SME representatives, Timo, suggests that perhaps they could talk through a potential application case. There was a a generalised, non-verbal consensus that this might be a good way to proceed and then some more (not uncomfortable) silence.</p> <p>Eventually Timo suggests that he</p>	<p>From first contact to engagement – this lack of formality where norms associated with teaching and inter-communication emerge from the group itself offer important insights into how to carry out this kind of workshop. Other regions have been able to draw on this experience and see what kind of level they would need to pitch this session. The balance of participants in Tampere who were familiar with open source software methodologies certainly had a bearing on what form of workshop would be successful.</p> <p>From first contact to engagement – in other situations where a higher degree of formality was normatively expected, moments like these could be frustrating for participants. This was not the case here where it seemed perfectly natural, in fact, desirable that the leadership of the session and the direction it took should be decided within the group,</p> <p>From project to community – the</p>
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<p>could discuss a case that his firm had been thinking of. He checks with the group that they would be interested in working on his example and they nod or at least don't say no or raise an alternative.</p> <p>Timo walks to the front of the room, picks up some chalk and begins working on the blackboard, trying to describe the product his company has been working on. The case involved a migratory service which involves taking data from one CRM and making it available to another CRM without using traditional data import / export methods. Instead of data 'travelling' from one system to another Timo described the application as allowing access to data held within each system's repository.</p> <p>As he describes the software project he draws on the board and the other participants stop him to ask questions and request clarifications. Once they all feel they understand what the piece of software Timo describes is about there is another pause. Timo sits back down in his seat.</p> <p>To the participants, the next stage seems obvious (although personally, I've no idea where this is heading): they must now try and code the piece of software.</p>	<p>training content, the example used, they way in which it is taught and the leadership of each stage is resolved by the group without reference to an over-arching agenda. This bears a strong likeness to the social and organisational dynamics found in open source communities. The fact that these practices were allowed to take precedence in this session leant a tremendous sense of credibility to the process.</p> <p>Engaging with innovation – Timo physically maps out the service on the blackboard, trying to communicate the basic design principles. The group appears to learn a lot through the course of this process and seems generally interested in the case Timo presents. Issues relating to security, trust and identity within the DBE are all discussed in detail but ultimately there are more open questions than answers in this regard.</p> <p>From project to community – the leadership role is not assumed by any individual during the workshop. There is a process of constant checking, to see if the group are interested, if they feel this is the right direction to take and at the end of this process Timo stands down to see what comes next.</p> <p>Engaging with innovation – the software methodologies that are being acted out in this workshop are obvious to those who use them, but to a layperson they are not clear at all. The design of these training sessions therefore</p>
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<p>At this juncture some energy comes into the room. There is some laughter and jokes. Timo puts the question to the group - 'who would like to code this?'. There is a laptop at the front of the room hooked up to a data projector and he gestures to the chair in front of it. He opens up a Java coding session which appears on the screen at the front of the room. There is a light-hearted sense that someone will need to give a performance and a low-level competitiveness over to who is going to take the chair. Tim makes a comic gesture where he clasps his hands together and stretches out his fingers like a concert pianist preparing to play. Pablo laughs at him and makes a gesture of blowing on his finger tips and rubbing his hands together. Another participant rolls his shoulders and moves his neck from side-to-side, like a boxer limbering up. After all this, they agree that in fact Timo should continue as he has the best understanding of the project. He sits down and begins to code whilst the rest of the workshop participants shout out suggestions, questions and raise points for discussion.</p> <p>By the end of this 'multi-programming session' a huge amount of technical detail has been discussed and there is quiet yet palpable admiration expressed for Timo's coding ability.</p>	<p>needs to be undertaken by a practitioner or allowed to be emergent as in this case.</p> <p>From project to community – the emergence of leaders, the consensual processes displayed as well as the keen sense of 'show' and being judged on performance are all aspects of the way on-line communities carry out there work virtually so it's perhaps unsurprising that those characteristics of community surfaced as physical qualities here.</p> <p>From first contact to engagement – this has been a rare insight into what takes place in a virtual, multiprogramming environment and in true open source style, someone's reputation has been enhanced through the process.</p>
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5 Research Results

5.1 Introduction

This section describes the 6 analytical categories that emerged from a systematic analysis of primary data collected over the course of 14 interviews with SMEs and 7 engagement events. Concepts and examples are taken from each category and supported by ‘vignettes’ or sketches. The categories described are the same as those used in the example in Section 4.2 above. These categories were developed through the grouping together of lower level concepts which then became properties and dimensions of higher level categories. They are informed by the theoretical framework for this research which took ideas from the practice lens and from actor-network theory. Each category describes properties through which SME engagement was supported or inhibited. A core category of which all categories were a property or dimension was developed to ensure that higher-level categories were sufficiently integrated. This core category was ‘credibility and attunement’. The table below lists each of the 6 conceptual categories and provides a brief description of their characteristics.

Figure 5.1 Table of categories and concepts

Concept		Description
1. Engaging with technical innovation		Specific engagement challenges associated with fostering interest in advanced technical artefacts which exist as concepts but have yet to achieve a stable physical form
Sub-concepts		<ul style="list-style-type: none"> • Engagement in advanced research projects: pre-prototype • ‘Marketing speak’ and ‘selling vapourware’ • Enrolling through links and joins • Building infrastructure: building community • Governance, trust and identity
Concept		
2. Regional Perspectives		The background and situation of regional catalysts varied as did the credibility of regional actors
Sub-concepts		<ul style="list-style-type: none"> • Situating regional catalysts • Regional characteristics • ‘DBE influencers’ and markers of credibility • Regional attitudes to local politics and politicians • Regional attitudes to universities
Concept		
3. SME Perspectives		Characteristics and requirements with

	respect to engagement as stated by SMEs
Sub-concepts <ul style="list-style-type: none"> • 'Engagement – with what?' • Staying engaged • Technology and political engagement • Sector-driven v. serendipitous engagement • 'Gorillas in our midst' • Reasons for non-engagement 	
Concept	
4. Engaging with project instruments	The roles and entities created by the project – such as the role of driver or regional catalysts or contractual processes of engagement
Sub-concepts <ul style="list-style-type: none"> • Contracts and cost models 	
Concept	
5. From research project to community	Open source principles have been adopted by the project yet the changes required to move from project to community are significant
Sub-concepts <ul style="list-style-type: none"> • Sensitisation to open source • Open source development methodologies • DBE technology - first contact • Philosophy and pragmatism 	
Concept	
6. From first contact to engagement	The process through which attunement and credibility were fostered over time through one-to-one communications and the design and 'staging' of training events.
Sub-concepts <ul style="list-style-type: none"> • First contact with SMEs • Event planning • Event staging and conditions of trust • Feedback loops 	

In many senses, the data presented in the vignettes which follow capture the situated experiences and in practice decision-making carried out by regional catalysts. The regional catalysts worked closely with SME drivers and potential drivers in their areas and therefore became highly attuned to both

regional and SME perspectives. They were also attuned to issues associated with technical innovation since, in addition to the SMEs, they too wanted to know how the technology would be rolled out.

The key concepts and sub-concepts developed from analysis are described below. Each concept links together a series of key ideas or sub-concepts which have been derived from fieldwork materials. Number 1 to 6 were allocated to each concept. In some cases, a sub-concept was relevant to more than one conceptual category. In these instances, a reference to the related concept follows in brackets e.g. (see 6).

5.2 Concepts derived from analysis

5.2.1 Engaging with technical innovation

Engagement in advanced research projects: pre-prototype

A significant challenge for regional catalysts and DBE project partners as a whole was to initiate engagement activities prior to the availability of DBE technical components which were in the process of development. This set of circumstances was inevitable to some extent: it would have been too late to start engagement activities at the point when technical components were released and so pre-emptive engagement action was required. However, the reality of this situation was that early recruitment events lacked any applied examples or technical demonstrations. This was a 'pre-prototype stage' where even communicating the basic concept of the DBE presented difficulty due to the advanced nature of the technology. An entire workpackage was devoted to communication but developing suitable content for presentations to SMEs was not always successful (see 6). Higher level scientific or business overviews were, in general, met with a 'so what?' attitude from SMEs. This distinctive stage of engagement is no longer relevant to the ongoing engagement practices of the DBE project as technical components have now been released and successful basic demonstrations and application cases have been created. However, the issues encountered here and the strategies that were suggested by SMEs to overcome these problems are highly relevant to advanced research projects attempting to foster engagement in technology innovation. The processes of engagement at stake are specific to being a research project and are different to other forms of engagement in technical innovation such as those found in traditional software rollout situations or those found in open source communities.

'Marketing speak' and 'selling vapourware'

There was criticism at engagement events and in SME interviews that project partners were indulging in marketing speak. For example, the idea that the DBE was a 'unique technology' that would 'revolutionise European software development' quickly drew criticism. Presentations that focused on higher order concepts rather than what the technology would 'do', coupled with the fact that the technology in question did not exist in any appreciable, tangible form, led to accusations that the project was attempting to sell 'vapourware'. SMEs made repeated and forceful requests for tangibles—documentation,

release dates, components to test, code to compile. The absence of these elements hindered the process of gaining the trust of SMEs but it did not altogether quash their interest. For some, when asked why they had remained involved in the DBE given these criticisms, SMEs would most commonly talk about the architectural principles of the DBE. With its 'meta-approach' to standards, languages and ontologies, the potential this architecture suggested for 'levelling the playing field' with respect to small and large software companies was something that carried wide appeal. For others, this was a question of software design methodology. Those familiar with open source methods were happy to proceed with technical components that were works-in-progress whilst others wanted to see the finished product (see 5).

Enrolling through links and joins

In the first technology workshop held in the West Midlands, SMEs were quite explicit about what they had found useful about the workshop and what they had disliked. A particular set of circumstances created this situation. The programme for the workshop had been designed around a demonstration of the technology where SMEs would get the chance to see in detail exactly what a DBE technical component looked like. Due to unavoidable circumstances, the person responsible for providing the demonstration was, at the last minute, unable to attend the workshop and so for the SMEs 'the point' of the workshop was lost. The programme was altered but the SMEs were left with a sense of frustration at once again hearing about higher-level concepts without seeing anything tangible. At one point the programme was challenged and the SMEs insisted that technical DBE partners gave them a practical account of how a software service could be integrated within the DBE environment. Over the course of a lengthy group discussion, some basic steps were established describing how to write an adaptor that would link legacy systems and services to the DBE infrastructure. Once it had been established that this was what was required, SMEs began to relax. One SME summed this up, saying; "We don't care about the theory, the technical viewpoints, we just want to understand what you're asking of us. The order of the workshop should have been the legacy adaptor, delivery date of software, documentation – then 'wow' us with the possibilities" (see 6). Understanding how to link their existing services to the DBE was more meaningful to the SMEs than material which was more theoretical and removed. Diagrams, presentations, demonstrations with 'dummy' links to components were insufficient. In order to be convinced, SMEs wanted realistic information about what they would have to do.

Building infrastructure: building community

Towards the end of the coding workshop in Tampere questions were asked about the network of FADA nodes. At that point in time the word 'network' seemed rather grand given that there were, in fact, only 2 nodes. Workshop participants started going into the FADA node management software to see what was required to add a node. One of the participants added a node as the others sat talking and demonstrated to another participant how he had done it. From two nodes there are then three and then four. Some of the

other participants have problems with firewalls and are unable to contribute, but the excitement at having doubled the number of nodes in the network in such a short time was quite obvious. A retrospective 'history of the DBE' was joked about, with participants saying how we would be able to look back and say - 'Do you remember when there were only two nodes in the network?' One of the workshop participants offered to create a GPS application to visualise the nodes geographically so that the developing topology of the network could be mapped. Someone suggests setting up a FADA node 'information service'. There is a strong and palpable sense of building community in adding nodes to the network. Invoking a sense of history and developing a geographical sense of the network adds further weight to this feeling. This kind of proliferation does not resemble marketing or selling.

Governance, Trust and identity

Trust, identity and data security represented a key area of concern for SMEs. Once attached to the DBE infrastructure there was no assured standard with respect to data security. To have such a standard would conflate with the underlying DBE architecture. However, as small software houses are often responsible for systems that process core enterprise data, being able to ensure their clients' data security was a key concern. Issues of trust and identity went hand in hand since trust is difficult to ensure without identity. Conversations about the level that security measures could be applied, digital keys and how to attain trust without closing the network were common topics of conversations in both engagement events and in interviews. No answers were available to offer on the part of the project and the impression that there was work to do at both the technical level of the DBE and at the level of DBE governance remained. Detailed feedback was provided to the DBE team working on regulatory frameworks and some joint research interviews were carried out.

5.2.2 Regional perspectives

Situating regional catalysts

In Tampere and Aragon, regional catalysts were based in government funded, IT related organisations that had long established relationships with a network of regional SMEs. They offered incubator and training services for SMEs and were commonly understood to act as a filter, offering advice on technology adoption to SMEs rather than acting as sales people. In this respect, the experience of West Midlands regional catalysts contrasts with those of the other two regions on this issue. The underlying government and local government support for promoting IT development among SMEs is less pronounced in the UK than in other European countries. For this reason the West Midlands is an interesting case in point that serves to illustrate the kind of agencies and institutions that other countries in this position may need to mobilise. The regional catalyst for the West Midlands was a local university. Whilst the university had experience of carrying out research with local businesses they did not possess the specialist knowledge and historical relationship with SMEs that the regional catalysts in Tampere and Aragon had. Therefore, achieving first contact with SMEs in the West Midlands was

harder to establish since there were no ready-made historical relationships or network of contacts; these had to be sought and slowly worked toward (see 6). After some time, the West Midlands regional catalysts opted to use local business networks. Whilst the chambers of commerce did not offer a particularly promising start, eventually a local network of small IT companies was able to offer access to a list of contacts. It could be argued that the West Midlands regional catalyst was not an ideal type and indeed further down the line there may be sustainability issues in this region. However, engagement has not suffered as a result of this and it could also be argued that stronger, more entrenched regional relationships will be formed with the DBE as a result.

Regional characteristics

SMEs and regional catalysts offered their own understanding of regional and national characteristics and how these influenced the way business communities worked within the region. In Tampere, the expression, 'every man must build his own house' was used to explain attitudes towards community and collaboration. In Aragon, the historic tendency of the Aragonese to be somewhat insular and mistrustful of strangers was stated by a number of interviewees as reasons why there was a mistrust of IT services such as e-commerce and e-banking. With reference to the DBE, the idea that business rules for pricing goods would become accessible was met with a certain amount of horror because 'pricing in Spain is always private'. Regional understandings of logistical and geographical characteristics also played a part. For example, Tampere is considered a satellite of Helsinki. Not many companies have their headquarters in Tampere and so not much research and development (R&D) is carried out there. This capacity becomes outsourced to SMEs who offer IT consultancy and to the local technical university. The city of Zaragoza which is the capital city of Aragon is situated in a central location between the alps and 4 major Spanish cities. An important new logistics platform (famously used by the successful Spanish clothes chain Zara) was perceived to have 'put Aragon on the business map' and there was a clear sense of the city as 'up and coming'. The West Midlands and Tampere were both industrial regions which had suffered economic depression following the demise of local industries but which have both seen a significant amount of regeneration. Similarly, there was a kind of 'buzz' about developments within the region. Understanding these characteristics informed SME attitudes and regional catalyst decision-making in an indirect yet formative way.

'DBE influencers' and markers of credibility

An important difference between each of the regions was the varying status and credibility that different regional actors lent to the process of engagement. In strategy terms, the importance of these kinds of actors had been seen in advance and the label of 'influencers' was given to them. However, sensitivity as to which actors were a positive influence and which negative in the eyes of SMEs was an important aspect of engagement. The involvement of universities and local politicians were particularly significant examples of this (see below). There were some markers that went beyond regional

boundaries such as the involvement of open source leaders (see 6) or the participation of 'big' technology companies as project partners (see 3). However, in regional terms, catalysts used their situated understanding of SME attitudes; involving actors where they were thought to lend credibility and steering away from them where they did not. The involvement of these actors was primarily in evidence in the design and organisation of engagement events (see 6).

Regional attitudes to local politics and politicians

Whether or not to involve local politicians in the process of engagement was a decision that regional catalysts took almost instinctively, based on their awareness of SME sensibilities. In Aragon, it was understood that local politics would play an important role in enhancing the credibility of the project and 'engagement interviews' arranged by regional catalysts included a meeting with a local politician in charge of IST policy. So strong was the perceived influence of local politics, that it was suggested that SMEs would simply not be interested in the project if regional catalysts could not demonstrate that it had the categorical support of local politicians. Alignment to regional IST policy and the inclusion of local politicians at engagement events were therefore extremely important elements of the engagement approach the Aragon regional catalysts adopted. When questioned on why this level of involvement was so important two reasons were commonly given in interviews: the first was a lack of trust in IT developments following the crash in technology share prices in 2000; and the second concerned the amount of bureaucracy and 'red tape' that local SMEs had to overcome in order to get anything done. It was perceived that political support would make the inevitable process of form filling and 'rubber stamping' less arduous. The situation in Aragon contrasted with that the West Midlands and Tampere where local politicians had played no role whatsoever in engagement. The attitude in the West Midlands was that politicians were largely ineffectual and local government support for small business so weak that there was literally 'no point' in involving politicians. In Tampere, this position was taken one step further and it was commonly felt that an association with local politics might detract from the credibility of the project in the eyes of the SMEs.

Regional attitudes to universities

The role and prominence of universities in the engagement process was another area where there were significant variations in regional attitudes. In the West Midlands, the University of Central England in Birmingham was responsible for housing the regional catalysts. In terms of credibility, this was seen as a positive state of affairs as universities were felt to offer a level of impartiality, as they would not act out of commercial bias and would offer perspectives that were not simply purely business or market oriented. For the West Midlands regional catalysts, although they did not have access to a ready-made network of SMEs, they soon felt able to step into their 'natural role' as educators, supporting SMEs in process of co-learning through engagement events. However, the presence of 'too many' academics at research meetings, coupled with the fact this was an EU funded project raised concerns that the project would not be able to create direct and tangible

business results. In Tampere, local universities were seen in a positive light. Having respected academics (particularly computer scientists) speak at engagement events, as well as physically holding recruitment and training events at the university were seen as important markers of credibility. In Aragon, the university of Zaragoza is one of the oldest and largest universities in Spain giving the region one of the highest rates of university attendance in the country. Nevertheless, universities were described as 'too abstract', 'too focussed on the theoretical' and not sufficiently in touch with 'the real world' to be in a position to work productively with small businesses and played no role in the engagement process whatsoever.

5.2.3 SME perspectives

'Engagement - with what?'

Difficulties associated with communicating the exact nature of the DBE technology coupled with the lack of prototypes and demonstrations created serious challenges for early engagement activities. Regional catalysts were placed in the position of having to reassert the fact that the DBE was a research project and that SMEs were being asked to engage in a process of innovation rather than test an existing technology. In trying to identify with the ideas presented SMEs would try and envisage what kind of customer base the DBE would allow them to reach or what new business models the DBE would create. The lack of a clear application case that could demonstrate the value proposition being made rendered this process extremely difficult. SMEs were left with the question, 'what is it we have to do?' and felt there was a worrying lack of clarity surrounding the targets they would have to achieve. At first SMEs thought they were being asked to build a service for the DBE and that in return they would receive funding and increase their customer base through the DBE infrastructure. This was evident in the questions asked at the end of early engagement sessions. Another common concern was, having committed their time and effort, what would happen once the formally funded part of the project ended? Reassurances about the project goal to build a self-sustaining community were given but concerns over 'wasted effort' were in evidence.

Staying engaged

The technical architecture of the DBE was one of the most widely cited reasons for why SMEs had remained engaged with the DBE, despite initial doubts they may have had about the project and despite the absence of technical components for them to assess. The 'meta-level' aspects of the DBE technology and their implications for the development of business services were difficult to convey, but once they had been successfully communicated, generally after a prolonged group discussion, SMEs could see an intrinsic value in what the project sought to achieve. Some SMEs were drawn to the explicitly open source design of the DBE, although questions were raised about whether the project was sincerely open (see 5). The opportunity that the DBE presented for learning was another reason that SMEs cited for staying engaged. Characteristically, SMEs have a limited

capacity for in-house research and development and using client projects for any form of experimenting with new products was regarded with disdain. Without exception, the guarantees and promises that SMEs made to customers were of paramount importance and anything that had the potential to compromise client relationships was simply discounted. Interestingly, funding did not feature highly among SMEs reasons for engaging with the project; one SME in the West Midlands opted to abjure funding completely.

Technology and political engagement

As well as open source values, a significant number of SMEs (just over half) were drawn to the DBE as a project / technology that sought to address social inequalities. From a business point of view, this was argued in terms of SMEs feeling 'squeezed out of the market' by larger technology companies through the monopolisation of standards. SMEs said that once a technology or standard had been monopolised they were no longer able to create products at a cost point their customers would accept. In discussions, the concepts of collaboration and community were routinely contrasted with concepts of competition and pure business. In some cases, the 'levelling' aspects of the DBE were interpreted in explicitly social terms and associated with values about social equality as an intrinsically good end to strive for.

Sector-driven v. serendipitous engagement

As part of the overall engagement strategy for the DBE, regional catalysts were asked to propose sectors of local industry where they felt they would find the most receptive target groups for DBE adoption. In Aragon, the tourist sector was identified and indeed the driver SMEs formally engaged in the project were involved in wholesale tourism. Although the prevalence of high-tech companies was cited as important in the regional profiling of the Tampere region, during engagement a specific area of IT work began to take precedence as SMEs were recruited. All of the driver and prospective driver companies in Tampere were involved in systems and data integration. They were all involved in providing consultancy on how to create a flow of enterprise data between popular but 'monolithic' commercial systems. They saw the DBE acting as a useful infrastructure upon which this kind of middleware could be built. In the West Midlands the range of companies that were attracted to the project offered a range of different services—from training management systems to inventory systems for tracking hazardous waste—and were associated with public and private sector organisations. Ironically, overall, the data suggests that trying to gain credibility in the eyes of a particular sector may unnecessarily narrow the field with respect to recruitment and staying open to the emergence of unanticipated types or groups might be productive.

'Gorillas in our midst'

There were a variety of attitudes towards the fact that among DBE project partners were some very large technology companies. For some, this was a reassuring aspect of the project and signalled that there must be something commercially significant about what the project aimed to achieve. For others, larger companies had the capacity to lend stability to a project and ensure that

it would carry on past the end of funded work. However, there were some SMEs who felt distinct concern about the involvement of these companies, who were referred to as 'gorillas' due to a common perception that their actions lacked subtlety due to an over-reliance on size and strength. The open source character of the project and its focus on smaller companies was challenged on the basis that distinctly proprietary larger companies were involved. The argument that some larger companies have learned to be good citizens was posited but a level of wariness remained (see 5). There were concerns (based on experience) that larger consultancies would 'come and work' with an open source SME for a couple days and then claim collaboration on the project they had looked at together. There were also concerns that parts of the project would be 'carried off' by gorillas (or made proprietary) in which case SMEs would effectively lose any return on the effort they had put in. The general attitude was one of tolerance coupled with vigilance but for the open source developers there was no fundamental threat, it was simply a case of – 'if they can't be good citizens, we don't need them'.

Reasons for non-engagement

Needing to be 110% certain that a technology was up to the job before it could be used in a client project was a common concern among SMEs and, for one company in particular, this was reason enough not to get involved with DBE. At the end of an engagement event in the West Midlands, two potential drivers announced that they were going to drop out of the project because they were more involved in systems integration and did not have a specific service to offer (which turned out to be ironic, given the Tampere experience). For some it was not a case of dropping out completely but of 'waiting' for the next phase of engagement to see what the technology would look like then. Beyond wanting to simply see the technology, a key concern was that of technical maturity as a marker of whether a product would be able to establish itself in the marketplace. The example of existing infrastructural technologies such as those application servers provided by Oracle or IBM taking years to establish themselves was used. An issue which could not be countered by discussing the merits of different software development methodologies and 'ways to market' was that of limited human resources. As companies who, by definition, do not employ many people, a number of companies were forced to withdraw from this phase of engagement because they needed all their employees to focus on a particular project deadline.

5.2.4 Engaging with project instruments

Recall that project instrumentation refers to those aspects of the DBE project that were constructed by project partners as a means of instrumentally shaping the course of events. These can be funding mechanisms, tender or sub-contracting processes, legal or contractual requirements. Alternatively they can be strategic instruments such as the definition of recruitment target groups or the time phasing of a project.

Contracts and cost models

Defining what was expected from SMEs occupied a significant proportion of early engagement events (see 3). Describing contractual requirements and funding models was something that required both one-to-one support and discussion at engagement events. Internally, it had taken time for the contractual mechanisms through which SMEs would be engaged to reach a point where details could be released to SMEs. Ultimately, each regional catalyst had to devise its own contractual model that satisfied the requirements of both the project and the institutions that were housing the regional catalysts. A sub-contracting, as opposed to tendering process, was decided upon. However, each of the regional catalysts experienced problems with finding a cost model that SMEs could work with. There were also difficulties when project requirements clashed with requirements of the regional catalysts' host institutions. This was a particular issue for the West Midlands where the university bureaucracy conflated with project machinery. In this respect, the university was not 'set up' to administrate or legally support the sub-contracting process. A new contract was created with specialist solicitors so that the university is now able to cope with such work.

Strategic instruments

The terminology and strategic vision of induction, recruitment and particularly training set up a number of complicated paradoxes in the DBE. The pre-prototype character of early engagement events meant that, in effect, very little DBE 'knowledge' had stabilised sufficiently for it to be expressed as 'content'. This had implications for both the development of the knowledge platform and the development of shareable or concrete training materials. Internally, early engagement events came under the banner of training, but in many senses this was a misnomer. The character of these events bore more similarity to a 'co-learning event' where project partners worked collaboratively to arrive at a mutual understanding of business and technical concepts. Strategically identifying learning blocks and stating that content will be added as time passes does not address the central question of 'by what means?'. A tendency for easy references to 'knowledge' and 'content' created misplaced confidence that the format and agenda of training events would simply appear from nowhere (see 6).

NB Project instruments is an extremely important area of engagement practice but—particularly on the issue of contracts and cost models and specific issues that arose from proposal writing on the part of SMEs—there was a distinct lack of sufficiently detailed empirical data. This is something that could be addressed later but since these issues did not knowingly deter any SMEs from engaging, they are not pursued in this report.

5.2.5 *From research project to community*

Sensitisation to open source

Some key observations regarding the character of the DBE and its claim to be an open source development were made in both SME interviews and at engagement events. However, taken as a whole, there were a range of different attitudes towards open source in evidence among the group of potential drivers. Of the 11 SMEs interviewed, 3 were dedicatedly open source although they were not averse to using proprietary solutions if a particular job called for it. Predictably, these SMEs were relatively sensitised to issues surrounding open source and were quick to criticise the DBE on the extent to which either its organisational or software development practices were actually open. For the remaining 8 SMEs, interest in open source products and development methods varied. One described open source as a 'fad' which did not merit serious attention, another described it as a 'cliché' which had become overused and in most cases did not apply. For the remainder, most had a keen interest in open source and considered it important to 'the future' of software development but were not exclusively committed to it as a company. In most cases, they were happy to use open source solutions if there was one available or if a client expressed a particular preference. However, none of these companies described themselves as in a position to 'give anything back' to the community, although most said that they would like to if they had enough resources to do so.

Open source development methodologies

Whilst sensitivities to open source agendas varied, pressure to 'see' technical components of the DBE was the same if not stronger among companies with open source experience. Not only did they want to see some proof of the DBE technology's existence, but for them having access to technical components during the development process was significant for a number of important reasons. Firstly, it was important from the point of view of open source software development methodology process. 'Parachuting in' to a project which already had a development history required a much greater learning effort than one which developers had the opportunity to be involved in early on. Norms regarding how decisions are made within a group of developers were also seen as an important aspect of development which should be arrived at collaboratively. For example, the use of blogs and open coding forums were preferred vehicles for communication rather than closed e-mail lists. There were also concerns that the quality of code and the coding conventions produced within small closed groups would be idiosyncratic and require a significant standardisation effort. Finally, there was the distinct impression that both organisationally and in development terms the project was, in fact, closed and was simply paying lip-service to open source values. The conflicting message that SMEs were receiving placed a significant amount of doubt and incredulity in their minds and the stated intentions of the project were treated with a fair amount of scepticism.

DBE technology – first contact

The first piece of DBE related code that SMEs were given access to was code relating to the FADA (or Swallow) project. There was no formal announcement that this code had been released and not all SMEs were told about this component in the first instance. An SME in Finland who took a look at the FADA project in SourceForge was surprised (and disappointed) to see that this project obviously had a long history, since developers were already on version 16. On looking for some support materials to enable him to get to know the project, he found some PowerPoint slides but no blogs, forums or other rich forms of communication which ordinarily support open source developments. He tested the technology and effectively opened a 'base line' for his own learning and involvement. However, from his point of view, he had access to the code but he didn't have access to the project and so he continued to wait. Whilst the FADA project gave him insight into how the underlying infrastructure would work there was still no evidence of the distributed, peer-peer technologies in which he was interested and so he was still left asking – 'where's the DBE?' He waited until eventually, a SourceForge source dump was made of the Servent. However, as was typical of his previous experience, it was a case of 'here's the code, do whatever you want with it'. Disappointingly, the code was not in a good enough state to be compiled into a working programme so the developer tinkered until he found the additional pieces and then he e-mailed for assistance. Initially, he got no response so he contacted the regional catalyst who passed on his questions and finally the answer was received that there was another version of the component he should try. The developer found the routing of his question, the delayed response time and the state of the code a huge disincentive. On this point he said, "That's messy and basically if it wasn't something I was already pretty interested in, I would have basically just dumped this stuff as soon as I saw it." Having tested the new version, the developer made some modifications and posted details of them to the public forum on SourceForge so that the next person coming along could see what he had learnt and hopefully wouldn't have to go through the same experience.

Philosophy and Pragmatism

Contrary to much of the literature on open source, attitudes towards open source software development and open source community were expressed in very pragmatic as opposed to philosophical terms. In development terms, the basic principle that the more eyes you have looking for a bug, the quicker it will be found was held to be true. There was also the question of software release. Waiting for larger technology companies to resolve bugs in proprietary software and then release a new version could pass on significant delays to SMEs who had come up against the problem. Instead of fixing the problem themselves and pushing ahead with the work at hand, these delays were passed onto clients, making project timescales difficult to manage. This striking lack of idealism was also apparent in political attitudes. The local politician responsible for IT policy in Zaragoza contrasted his approach with that of another region in Spain, Extremadura, whose local government had decided to go totally open source. For this politician, the question in Aragon

was one of choosing the most appropriate solution, whether that be a proprietary solution or an open source one. Open source business models were also described as highly pragmatic, significantly reducing risks for smaller software companies.

5.2.6 From first contact to engagement

First contact with SMEs

Regional catalysts in Aragon and Tampere were already firmly embedded in an existing network of relationships with regional SMEs. For them, a common approach for stimulating initial interest in the DBE was to mention it informally at events and meetings taking place in support of other projects they were involved in. For example, in Tampere, a special interest group who were involved in promoting open source provided a particularly useful forum for fostering interest. In this respect, the West Midlands regional catalysts were at an initial disadvantage in the very early stages of engagement. Later they collaborated with Open Advantage, an open source project. However, there came a point where each regional catalyst needed to reach a broader audience and deciding which database of local business details to use was an important decision. In Aragon, the regional technology policy office held a comprehensive database of IT companies. This list was refined and a mail shot was sent out which included a letter from the regional technology policy office. In Tampere, the regional catalyst had its own database and sent out information addressed from the catalyst host organisation. Regionally based support for local business is not as structural in the UK as it is in other countries. For the West Midlands, organisations such as the Chambers of Commerce did not hold the required information and eventually a local business association called WMITA provided the necessary contact information and provided a useful contact point with local IT companies. In each region, follow-up phone calls and one-to-one meetings with companies were crucial in order to maintain momentum after the initial mailshot.

Event planning

Engagement events were planned differently in each of the DBE regions. The variations between them drew out important yet nuanced regional differences (see 2). Event planning, design and content creation was undertaken almost exclusively by regional catalysts who applied their own judgement, based on their situated understanding of regional context. The West Midlands and Tampere moved forward with group engagement events before regional catalysts in Aragon did. Designing the programme of these events was equally contextual. Tampere tended to lead the way with engagement events with West Midlands following close behind. Beginning with a few presentations given to local technology forums, the first event held in Tampere was called a 'technology workshop' and was the first DBE engagement event to take place. Some academic presentations and presentations from technical project partners were given and there was significant emphasis placed on discussion. The second event was the 'coding workshop' described in Section 4.1 where the SMEs actually used the

technology to test out their ideas. It should be noted that it was not 'known' in advance what would be the most appropriate focus for each event. Ideas about what event was needed next crystallised slowly over a long period of time. An idea for the next event envisaged for October 2005 was, having tried running one service on the DBE, to link two SME services together. In the planning of events regional catalysts gave careful consideration of their audience. From pitching content to determining the timing and duration of events, the character of SMEs as organisations with little spare time and human resources was put first. For example, it is typically the case that SMEs do not have much time to devote to research and development so one or two day events were opted for. There was also an explicit emphasis on punctuality as a way of demonstrating that attendees' time was valued. Allowing mobile phone calls to be taken and accepting that attendees may need to leave during the course of the day were also factored in to event design with provision made for appropriate opportunities for re-capping.

Event staging and conditions of trust.

The character and format of engagement interaction differed between regions. In Aragon, emphasis on one-to-one meetings was maintained for longer than in the other two regions. The first 'event' was quite prestigious with a prominent politician giving the opening address and a reception of food and wine to follow. Ordinarily the press would attend any event attended by a politician such as this, but this time they were asked not to come at the request of the regional catalysts. It was felt too early to start developing a public profile for the project. The presence of a prominent member of the open source community at the event in Aragon led one of the presenters to offer him the opportunity to comment on a statement that had been made about open source activities in the region. The event at Aragon was held at the regional catalysts host organisation's premises and there was no academic input into the event. By contrast, West Midlands and Tampere both staged their engagement events within university campus buildings and invited relevant academics to give presentations. At the technology workshop in Tampere, SMEs were slightly uneasy that there were more project partners than potential drivers in attendance.

Feedback loops

No formal assessment of engagement events was carried out but attendees were quick to offer their opinion on how they felt sessions should have been run, both during the course of meetings and afterwards in the form of web blogs. In style and content, blogs are similar to an 'in practice' style of accounting for events and offered an important source of feedback. Written more or less immediately after workshops and events blogs written by SME attendees had the effect of opening out closed training events to the public domain. This kind of instantaneous feedback put the DBE in the public domain at a point the project had not necessarily felt confident enough to do. Otherwise feedback from engagement events remained internal

communicated through meetings and evaluation reports. Ideas from the questions, discussions and formats of engagement events were used to inform the development of the web site and knowledge platform. SMEs regularly asked for these resources which were not ready at the time early engagement activities were taking place. As an awareness of other regions and other SMEs participating in the project grew, there was curiosity as what applications, services and business ideas were being discussed. This had the potential to act as a natural seedbed for building inter-regional communication but it was decided that it was too early to encourage this level of activity.

5.3 *Practical research contributions to engagement*

The purpose of this deliverable has been to show how valuable data, insights, and feedback on engagement can be gathered through the use of grounded research methods. In Section 6, the findings from analysis are used to propose a potential basis for a theory of engagement. However, this section aims to demonstrate how the data collected in this kind of research can be used to support the engagement process as it is taking place. For example, documenting the opinions and concerns of SMEs created the opportunity for their points of view to play a part in project level decision-making, before SMEs were admitted as project participants. Whilst synergies between other work packages had been sought, this level of 'action research' was not an intentional aspect of research design. The following is a list of the opportunities which came about.

Feedback to project meetings

Speaking to SMEs and attending training and engagement events in each region meant that the researcher was in a position to provide immediate feedback to project meetings. Specifically, it meant input could be provided into business domain, knowledge platform development and training meetings (further details of the last two are provided below). In addition, the project General Meeting in Turin provided an important opportunity to feedback issues which had come up in SME interviews and over the course of engagement events. Transcripts of interviews were available and excerpts were displayed on a data projector and read out at sessions on open source, regional feedback and the knowledge platform. In effect, this gave voice to SMEs in a forum where they had yet to be granted access. Some key discussions and debates – particularly on issues of 'openness' – were influenced by the SMEs' feedback and some landmark decisions about releasing source code and ensuring adequate response times to enquiries were taken.

Building community

Through creating a cross-regional programme of interviews and consistently attending engagement events, the researcher became 'a familiar face' to SME drivers. It also meant that the researcher was one of the first people to have met all the drivers and to therefore have a picture of who they were as a

group. At this point, the drivers were not in contact with one another and there was significant curiosity about 'what other regions were doing'. Feeding that curiosity by sharing information and anecdotes from other engagement events was a form of community building although as yet there was no tangible basis for cultivating links. Retaining this level of familiarity with SMEs would seem like a desirable end to achieve. However, the nature of contract research means that the same person rarely gets to dedicate their time to one work task for a sustained period of time.

Interviewers space on knowledge platform

As it became clear exactly which companies were going to become driver SMEs, measures were introduced to ensure that these companies would not be faced with a stream of researchers. In particular, there was concern that SMEs should not be submitted to too many interviews and that research questions such as those designed to elicit company backgrounds and profiles, were not repeated. In order to guard against this, a forum was created in Moodle, which by the end of fieldwork had been installed as the knowledge and learning platform for the project. The area was made open to regional catalysts and those whose work involved interviewing or surveying SMEs. Details of past interviews as well as forthcoming plans to contact driver SMEs were posted and a discussion forum was started where issues such as 'how to give back to SMEs' and 'cross-regional discussion' were instigated. Coordinating interview schedules minimised the impact of research on drivers and brought about a synthesis of existing interview material, methods and rationales. Most importantly it safeguarded against the over-surveying of SME drivers.

Developing web site and knowledge platform design

One of the issues that came up during engagement events and interviews was the need for adequate web site resources. Suggestions for what this might include were forthcoming and were fed back to meetings. In particular, open source SMEs emphasised a preference for using those communication tools that coding communities were already familiar with using. Collecting together Web logs into blog aggregators or planets, using issue trackers and creating technical discussion forums where links to relevant components were drawn together in the same place were all concerns that were factored into web site design. Recognising the different communities of interest and dividing them into appropriate 'portal views' was another important contribution. These contributions led to the development of a base line methodology for developing web content which was derived from the methodology used in this research. Advocating a grounded, empirical approach it was argued that web content should draw together the threads of community engagement 'such as they are', reflecting back to web site users the relationships that have so far been formed. For example, where common questions or requests had been made such as requests for technical documentation, it was argued that, even if these materials were not available for posting, space should be dedicated for discussing their absence, therefore demonstrably engaging with the concerns of SMEs. Forums designed to continue discussions started at engagement events, drawing together

business ideas, technical ideas and frequently asked questions were also discussed. However, it was felt that it was 'too early' to encourage this level of engagement and regrettably the web site was not yet able to support this kind of interaction.

Training feedback

By attending meetings related to training there was an opportunity to provide immediate feedback to project partners and to represent the views of SMEs. Whilst no formal evaluation of training was sought from SMEs, feedback from individual training events was not usually in short supply. However, no other project partner attended each engagement event in each region during this period and so the longitudinal, cross-regional perspective gained through the project task reported on in this deliverable was unique. Whilst the relevance of cross-regional comparisons and retrospectives was not necessarily relevant in the immediate evaluation of events, they will be relevant to new regions and to the development of training materials for the knowledge platform. Since most of the interesting insights into engagement have come from looking closely at the situated decision-making of regional catalysts, there is also value in reflecting back to what they have been doing as for them there is limited time to stop and reflect. Key questions regarding sustainability after the project ends are fast approaching and understanding some of the underlying issues regarding their roles as disseminators, recruiters and training providers may provide support in the future.

Sustainability and governance

A particular set of research data on sustainability and governance became increasingly relevant to the development of discussions within the project and an internal paper was produced. Whilst no clear ideas on governance had been raised at an operational level, there were clearly pressing issues regarding the long term sustainability and governance of the DBE. Issues raised by SMEs regarding intellectual property, data security, open source licensing and as well as the constitutional and organisational mechanisms required to support the shift from project to sustainable community are urgent and deeply political concerns. If the project is 'taken over' by a single company or organisation, then it is clear that SMEs will feel that their contribution will be 'carried off' to serve that company's ends. However, constituting some form of governing body with appropriate voting mechanisms and legal powers is a necessary yet daunting task. There is a sense in which, within the project, ideas on governance and the future of the DBE are 'vying for power'. Individual parties seem unwilling to propose a model of governance for fear that it will be rejected or taken as a political 'move'. One solution could be to turn the process over to the SMEs who could appoint their own leaders and institute their own governing principles.

6 Towards a theory of engagement

6.1 Introduction

The purpose of this deliverable has been to show how valuable data and feedback on engagement can be gathered through the use of grounded research methods. This data has a role to play in supporting the engagement process, as the previous section showed. However, if the findings from this data are to hold any relevance beyond the case of the DBE then it becomes necessary to develop a theory, in this case a theory of engagement. For a full theoretical exploration of the topic, further sampling and conceptual development would need to take place. The theory developed would also need to be discussed in relation to other cases and analyses. For example, the theory developed here refers to an advanced research project that aims to produce a pan-European technical infrastructure. To add further dimensions, it would be necessary to consider the cases of other kinds of projects involving SMEs. This work lies beyond the scope of the current task but will be taken up as part of a process of academic dissemination. However, whilst not fully fledged, the findings from this work constitute the beginning of a process of theory development and, in themselves, offer considerable insight into the process of engaging SMEs in advanced European research projects.

The following is a synopsis of the concepts and theoretical categories generated from the DBE case. Since the purpose of theory building is to encourage generalisability across similar instances of engagement, contextual details are removed at this stage and specific examples kept to a minimum. When categories and concepts are compiled in this way and linked back to the theoretical discussions from Section 2, a basic framework for a theory of engagement is generated.

6.2 Credibility and attunement in SME engagement practices

Two of the most important challenges of engagement practice are credibility and attunement. With respect to SME engagement, this refers to the process of fostering trust and achieving credibility in the eyes of SMEs. An important aspect of this is a process of attunement where concerted effort is made to understand the distinctive norms, values and practices of SMEs. In the case of the DBE, a significant dimension to the process of achieving credibility and attunement was the project focus on developing a new and innovative technical infrastructure. However, the technical nature of this project did not detract from the fact that the process of engagement involved a deeply contextual or 'situated' understanding of regional characteristics and SME concerns. It is important to bear in mind that norms and values may vary substantively from region to region and country to country, and they may not necessarily be applicable to a 'type' of SME. For example, in the case of the DBE, the SMEs in question were all small software houses but significant

differences existed between companies familiar with open source ways of working and companies who had little or no experience of open source practices.

The importance of achieving credibility and attunement applies to the formulation of strategic instruments and project machinery and also to those who work closely at achieving relationships with SMEs and fostering trust. Reflecting these norms and values can occur in everyday interactions with SMEs; in the design, instigation and organisation of those interactions; and in the development of instruments to achieve both strategic ends and project requirements. The process of embedding norms and values into resources and organisational practices can be viewed as structuration (Giddens, 1984), where it is the product of routinised human actions; or as a process of inscription (Latour, 1998), where artefacts absorb the conventions that surround them and enact those conventions independently of human action. Both these approaches offer important insights for the study of technical artefacts and infrastructure.

A feature of advanced research projects is that, at the time early engagement activities are being planned and carried out, technical components may still be in development. This 'pre-prototype phase' of a project is unique within the life-cycle of a single project but remains relevant to planning engagement practice in other advanced technology research projects. The significance of the pre-prototype phase is that there is effectively nothing to 'show' SMEs. For a significant amount of time, both the identity of the effective users and the character of the technology could be unknown. This may present obstacles to engagement but need not impede it entirely. Interest in a particular aspect of the technical design or in the character of a project as open source, for example, can secure attention prior to the release of any technical components. In addition, being transparent about the status of technical components and providing provisional release dates has the potential to offset accusations of empty marketing and enhance credibility.

Acknowledging that, in the case of collaborative technology projects, engagement will eventually manifest materially (as well as socially) in the form of joint technical developments is an important realisation that affords a tangible focus on where, how and between whom/what links and joins will be made. In asking SMEs to take part in the collaborative construction of an infrastructural technology, a balance has to be struck between describing 'the whole idea' and providing details of the particular technical component SMEs will be asked to engage with first. From an SME point of view, the latter represents the highest priority as it allows them to assess the amount of effort involved and evaluate the proposition being made. The material links between SMEs and technical components can also serve to generate a palpable sense of community building as infrastructural elements are slowly assembled. As the community grows, detailed questions concerning trust and security can be expected. Whilst answers to these may not be straightforward, discussions regarding the formation of a prototype governing

body who will eventually take responsibility for these issues should be initiated in order to provide a channel for these concerns.

Cultivating trust is an important aspect of engagement practice which can have distinctive, region-specific implications. The quality of infrastructural or local government support for SMEs varies considerably between European countries. Whilst it is ideal to select a catalyst who is already embedded within a network of SME relationships, this may not always be an option. Identifying other kinds of business network is a good point of access, as is gaining access to a database of local businesses. Whilst some information about regions may appear anecdotal, it should not be underestimated how far this kind of information can be helpful and may play an important part in the process of attunement. Markers of credibility such as the involvement of local politicians or universities in the process of engagement can lend crucial credibility. However, these kind of markers are region- (and possibly even community-) specific. Making the wrong choice can detract from as well as lend support to the engagement process.

Making a clear proposition to SMEs about what is required of them near the beginning of the engagement process is crucial if they are to be able to assess whether engagement is feasible, let alone desirable. However, despite practical concerns, the range of possible motivations for staying involved with a project should not be underestimated. Generalisations about SMEs only being interested in immediate business returns can prove unhelpful. Interest in long-term aims and visions can also play a part, as can motivations stemming from social or political beliefs. Whilst it is important to stay in touch with those SMEs who look most likely to engage, it is also important to understand why SMEs drop out of the process. There may be no solution to the problems raised but there may be another round of engagement at a later point that constitutes a better time for companies unable to participate in the first instance.

The extent to which project instruments have the potential to construct barriers to engagement and place serious burdens on regional catalysts should not be underestimated. The terms 'machinery' and 'instruments' were used deliberately in this report to convey the complex, substantive and mechanistic ways in which these actors could come to bear on a situation. Actor-network theory suggests that these kinds of non-human (that is to say, material) actors are not overlooked in the analysis of any group or collective. This is even more true when it is the practice of engagement that is under examination. One-to-one support may get SMEs through initial proposal writing and sub-contracting stages, but ongoing support cannot be guaranteed. Ensuring that, as far as possible, the legal and organisational requirements for engagement do not conflate with the administrative practices of regional catalysts' host institutions is also an important consideration in this regard.

Open source engagement is a special case and requires its own engagement effort. Given the long-term aim of the DBE project to be a self-sustaining

community of software developers, achieving credibility in the eyes of open source developers was critical. However, if a project has begun life as a closed organisational entity using closed software design methodologies, making the transition from 'project' to 'community' will involve some radical changes. Hierarchical control lends itself to the construction of instruments such as overarching plans, models and strategic machineries (Ciborra, 1991). In untraditional organisational models such as those present in open source communities these kinds of development tools may not be applicable. Organisational attitudes and practices are as much to blame as closed methodologies for developing software for a loss of credibility in the eyes of open source community members. Having closed development groups who use coding conventions understood only by themselves and create limited documentation is acceptable for internal projects but if a wider community of contributors is sought these norms need to be overthrown. Installing appropriate legal instruments, ensuring an open and collaborative approach to management and decision-making and creating coding environments conducive to open code development represent radical changes. Planning for this transition by envisaging a governing body could be one approach to dealing with this but, ideally, instilling open coding and open organisational practices from the beginning of the project is preferable.

Early phases of engagement in advanced research projects where neither users nor technology have stabilised requires demarcation and should be planned for as distinct from other phases. Whilst recruitment is perhaps somewhat instrumental as a term, from the point of view of SMEs it shapes expectations and suggests that project machinery will be discussed, even if the project technology is still at a developmental stage. In contrast, labelling events as training has the potential to create false expectations. In reality, it was invited speakers, the embryonic agendas, and most importantly, the questions raised and discussions had at early engagement events that offered the first opportunity to create integrated learning and training materials. In a sense, this was the fulfilment of the training philosophy described in D25.1 where the construction of training content was described as evolutionary and deeply contextual, rooted in regional business and technical requirements. However, a serious omission from this strategy was the concept that intelligence and content would (and arguably should) be developed from early meetings and events held with SMEs. In this way, the content is necessarily contextualised, absorbing the norms and expectations of SMEs. Over-emphasis on the need to structure early training content in advance is a misdirection of effort. In lieu of this, a concerted effort to capture the priorities, misgivings and concerns of SMEs will offer far more support to processes of engagement and community building. Creating explicit mechanisms for formally feeding back an 'in practice' view of engagement events and experiences (rather than evaluating whether strategic aims have been met) provides a rich resource, not only for developing learning and training content, but for building application cases and business concepts. In the case of cross-regional engagement, it also creates an early sense of group or community and provides a seed-bed for encouraging cross-regional, inter-organisational dialogues.

7 Conclusions

The report began by identifying two predominant ways of thinking about SME engagement. The first was a managerialist approach that tends to over-emphasise strategic top-down control. The second stems from an 'epistemic split' between research disciplines that focus on the natural world and those that focus on the social world. In order to counterbalance both managerialist and epistemic tendencies, an argument for using grounded research methods was made. A thorough examination of how theory is developed from raw data through use of grounded theory analysis was carried out leading to the development of an outline for a basic theory of engagement.

In the example of engagement practices, the point of contact between SMEs, technologies and project participants was recognised as a powerful site of learning. The danger that what is learnt from engagement can be over-operationalised and important findings overlooked was highlighted and it was argued that drawing these findings into an iterative relationship with strategy design is beneficial, particularly in the case of tasks relating to training, knowledge and learning. Complementing strategy through rigorous understanding of practice may offer insights as to how learning blocks should be filled and knowledge platforms should be built. In the context of an advanced research project that seeks to engage SMEs, a significant amount of the knowledge generated is discovered with the SMEs themselves. Crediting their ideas and opinions by drawing upon feedback in the development of project instruments and resources encourages ownership and demonstrates that these ideas are being acted upon, thereby serving to reinforce a growing sense of community.

One of the issues raised in this deliverable which warrants further attention is the process of transition that the DBE is currently in the process of making from 'European project' to 'self-sustaining community'. A common concern of open source communities is how to maintain the commitment of community members after the initial launch of a project and this is a central concern of the digital business ecosystem project. A key factors upon which community sustainability hinges is governance. In the case of the DBE, creating a framework for governance refers to the need to establish an organising body which is trusted by contributors. The primary objectives of this body will be to instate the necessary legal apparatus to support technological developments and formulate a basic framework for community decision making to enable the community to thrive.

Working with open source companies also presents challenges to traditional academic methodologies for carrying out research. Being 'open' about research findings and objectives and sharing feedback with participants is to some extent normal practice for academic researchers. However, allowing for the collective development of ideas instead of 'carrying off' good ideas from field sites tests certain boundaries concerning academic competition for 'new ideas' and places specific challenges on the ethics of confidentiality. Turning

research findings round in a timescale when they are still current in participants' minds instead of 'sitting on them' puts the researcher in a difficult position between wanting to maintain commitment and momentum within a group and not wanting to be cast in the role of consultant. The potential for developing 'open research methods' requires further attention.

From the experience of engaging SMEs in the DBE project, it is clear that technology transfer is achieved through a dense network of carefully crafted relationships that are founded on trust. This is not a situation that can be suddenly created and so DBE project and nascent community will need to maintain close ties with the network or relationships that has been established in order to facilitate technology transfer. The DBE has discovered and put into action three dimensions to technology transfer. The first is transfer through the strategically constructed relationships that regional catalysts have fostered with SMEs as a result of the DBE project; the second is through the engagement of regional business networks and regional policy makers; and the third is through establishing interest and engagement within existing open source communities. Directly fostering this network of relationships as a means of technology transfer will be necessary and reflexively assessing the relative effectiveness of these means and their relevance to specific regional contexts will be necessary if the DBE technology is to achieve a satisfactory level of diffusion.

DBE project has accumulated significant research experience in the area of infrastructural technology and its relationship to regional economics, regional politics, regional competitiveness. This experience and the corresponding dataset has the potential to contribute to EU policy on the diffusion and adoption of infrastructural technology. Constructing an iterative relationship between 'top down' and 'ground up' approaches to proved to be a very successful methodology that yielded a high level of project knowledge and ensured close relationships with both regions and SMEs. In the early stages of the DBE social science partners contributed a high level 'top down' view of economic and political aspects of regional characteristics. As the project progressed, this data set was complemented by further data sets that took a 'ground-up' approach to SMEs, their relationships to regional policy and politics, and their ties to the region (material, logistical and community based).

If a longitudinal approach is adopted towards this dataset, questions concerning the relationship between large-scale technology infrastructure and regional development can be tracked from the level of individual SMEs to the level of the region and to Europe as a whole. This allows important questions to be addressed regarding the European software industry (and the role of SMEs within it), European policy and its ability to mobilise that industry through infrastructural technology developments.

This deliverable constitutes a social science contribution to the DBE project. The utility of social science contributions to EU projects has come into question in previous framework programmes. This contribution and others like it within the DBE project have aimed to show how academic contributions from the social sciences can be both theory and practice oriented whilst also

making important, tangible contributions to strategic project goals. These contributions are important to the process of focussing effort in EU projects and understanding how empirically grounded findings can support engagement and maximise synergies in integrated projects.

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