UNPACKING SCENARIO THINKING IN PRODUCT INNOVATION TEAMS: A PRACTICE APPROACH

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ABSTRACT

Scenario thinking is often presented as a bundle of methodologies, methods, activities and capabilities that enable firms to explore and exploit opportunities relevant future opportunities in the present. In this paper we ask the question: What is scenario thinking in product innovation teams? Drawing on the 'practice turn' in contemporary social theory, we 'unpack' scenario thinking as the use of scenario narratives to stimulate actions in the immediate present (also informed by the past) about possible futures in an attempt to improve understanding of the cost, returns, efficiency and all of the requisite information related to the creation and capture of value from new product innovation. The research employed a case-based approach with three software organisations and four new product innovation projects serving as the empirical research sites. With emphasis placed on the innovation teams' everyday practices and relationships in context, data for the empirical inquiry was collected using the qualitative methods of ethnographic interviews, non-participant observation and the analysis of organisational and project archival documents. Drawing on the case evidence, we account for the dynamic emergence of scenario thinking in innovation teams by identifying some quintessentially embedded practices, modalities and contingencies which gives form to the practice as manifested in the innovation teams' as they engage in their situated practice. These include human and material social interaction, flexibility through improvisation, and the emergence of human agency. We conclude the paper with a discussion of the managerial implications and some limitations of our research.

INTRODUCTION

As intense global competition demand more than ever that organizations capture sustainable value from their new product innovations (Lepak *et al.*, 2007), a growing number of organisations support and conduct scenario planning exercises to help them navigate and probe the complexity and genuine uncertainties surrounding new product development (Drew, 2006; Noori *et al.,* 1999; Jarke *et al.*, 1998). The practice involves the use of scenario narratives to stimulate actions in the immediate present (also informed by the past) about the possible future aimed at improving understanding of the cost, returns, efficiency and all the requisite information related to the creation and capture of value. Chermack *et al.* (2007: 381), in synthesising some disparate definitions of scenario planning, defined it as:

> A process of positing several informed, plausible and imagined alternative future environments in which decisions about the future may be played out, for the purpose of changing current thinking, improving decision making, enhancing human and organisational learning and improving performance.

The literature is replete with multitude but similar approaches to the practice of scenario thinking in organisations. A typical 'manifesto' on how the practice is facilitated the work of Wilson & Ralston (2006).

Step 1 — Develop the case for scenarios	Step 10 — Conduct focused research on key issues, forces, and drivers
Step 2 — Gain executive understanding, support, and participation	Step 11 — Assess the importance and uncertainty of forces and drivers
Step 3 — Define the decision focus	Step 12 — Identify key "axes of uncertainty"
Step 4 — Design the process	Step 13 — Select scenario logics to cover the "envelope of uncertainty"
Step 5 — Select the facilitator	Step 14 — Write the story lines for the scenarios
Step 6 — Form the scenario team	Step 15 — Rehearse the future with scenarios
Step 7 — Gather available data, views, and projections	Step 16 — Get to the decision recommendations
Step 8 — Identify and assess key decision factors	Step 17 — Identify signposts to monitor
Step 9 — Identify the critical forces and drivers	Step 18 — Communicate the results to the organization

Table 1 A step by step approach to developing and using scenarios

Source: Wilson and Ralston (2006).

Within the foresight and management literature, scenario planning used as a tool for long-range corporate planning has a long standing presence (e.g. *See* Amara and Lipinski, 1983; Brown, 1968), after all, the name scenario planning in itself denotes stability, order and control as if its outcome can be pre-assumed. Increasingly conceived as a bundle of activities, methods and competencies, it involves the creative combination and re-organisation of relevant past, present and future insights drawn from internal and external sources (e.g. Bradfield *et al.*, 2005; van der Heijden, 1996), it has been heralded as leading to other flexible but desirable organisational outcomes such as adaptive learning (Constanzo, 2004), improved decision making (Chermack, 2004), organisational ambidexterity (Bodwell and Chermack, 2010), and innovation (Drew, 2006; Van Duin and den Hartigh, 2009). Interestingly, a bulk of the existing literature conceptualises scenario thinking as a grand 'one-off' organisational strategic exercise facilitated by an external management consultant rather than a self-organised, dynamic, generative and iterative process which never comes into equilibration. For decades, scholars have privilege this episodic intervention which is not only unexciting and remote from the experience of managers as they think and develop images of the future; it also provide very little insight into how scenario thinking emerges from a process of becoming and lead to the generation of invaluable insights in innovation teams.

In this study we follow Mackay and McKieran, (2006: 163) to refer to the practice as *'scenario thinking'* in response to its durability and the significant role played by cognition and disciplined thinking in the building of plausible scenarios and the mapping out of their consequences to

reach optimal decisions. We also draw on the 'practice' turn in contemporary social theory to 'unpack' scenario thinking as they emerge in product innovation teams. Scenario thinking we argue is a social practice in a constant flux of transformation played out in the everyday work of a group of competent actors as an actualisation of a continuous process of *becoming* (Tsoukas and Chia, 2002). By this conceptualisation, we are therefore in sympathy with Cunha *et al.* (2006) when they argue that:

> The micro-interactions between people are relevant for understanding foresight for two reasons: (1) the future of the organisation is the result of the many activities that take place everyday in an organisational setting; as such the fulfilment of the foreseen future depends upon microscopic behaviour; (2) the foresight efforts of top managers are themselves influenced by micro-behavioural aspects.

The objective of the paper therefore is to move beyond the episodic paradigm to present a logical account of how the practice temporarily unfolds in innovation teams without the assistance of a management facilitator. This we do by placing emphasis on the everyday practices resulting from the many activities and microscopic behaviour that take place in innovation teams as they engage in their situated practice. In doing this, we seek to provide a new angle of vision to extend on the development and perpetuation of scenario thinking in autonomous, strategic, self-organised groups. The new paradigm as advanced in this paper makes no attempt to replace or invalidate the old one, rather it complements the first by seeking to cumulatively enrich our understanding of how the activities forming the nexus of the practice are constituted, reproduced, adapted and defined through ongoing processes (Langley, 2007: 271).

BACKGROUND

Why scenario thinking in product innovation teams?

Our chosen sociological level of analysis for the empirical inquiry is the innovation team. For us, the cultivation of scenario thinking in innovation teams is not only essential but also a strategic imperative because it represents the very "level at which observable changes take place in the way work is done and the management of innovation process can be witnessed" (Birkinshaw *et. al.*, 2008: 282). We posit that a 'foresightful' innovation team could be used as a proxy to measure organisational competitiveness as they often serve as the locus for the development of new products, services and processes that provide the bedrock for strategic diversification and corporate renewal (Dougherty, 1992). As a result many organisations may solely rely on them as a strategic group within the organisation which can be used to exploit the distributed expertise and limited resources to craft and deliver a mechanism for building the organisational market-technology knowledge base. Elsewhere, Feyerabend's (1987: 711) description of the attitude of fifteenth-century renaissance artists draws our attention to the importance of innovation teams when he observed that:

> They worked in teams, they were paid craftsmen, they accepted the guidance of their loyal employers. Teamwork already plays an important role in sciences; it was and still is exemplary in institutions such as Bell Laboratories leading to invention (such as the transistor) which may help us in our quest for a better world.

The innovation team's traditional purpose of linking technologies to markets enhances their latent agentic power in making important decisions related to the exploration and exploitation of relevant opportunities. Their everyday 'doings' are embroiled with a plethora of activities which

enable them to draw on existing organisational and social structures that are reproduced and transformed in action independent of their thought. Every single decision they take implies some assumption about negotiating a successful course into the future. In this regard, they knowingly or unknowingly employ scenario thinking in managing the uncertainties associated with linking their technologies with future markets. In the absence of a management consultant who often act as facilitator of scenario thinking, innovation team leaders by virtue of the strategic position they occupy within their teams set the context within which decisions are made. Their fundamental responsibility of finding the right way to sequence group discussions and managing the working relationship between group members, conceptualised as a new managerial role, makes it ideal to consider them as 'facilitators' of scenario thinking in the innovation teams.

A practice approach to scenario thinking

The theory of practice is concerned with the taken for granted sense of space and routines of actors as inscribed in the ways they enact their practice. It encompasses the "rich socially embedded clinical know-how that encompasses perceptual skills, transitional understandings across time and particular understanding of the particular in relation to the general" (Benner 2003: 5 as cited by Dougherty 2008: 37). In simple terms, it refers to what people do in their situated activities. Practices therefore can be seen as permeating almost every social life. For Schatzki (2005: 471) they are 'organised human activities' made up of "organised, open ended spatial-manifolds of actions". Placing emphasis on actors' *actual* activities in practice, *what* those activities are and *how* these activities are enacted, he goes on to argue that:

> Practices consist of both doings and sayings, suggesting that analysis must be concerned with both practical activity and its representations. Moreover we are given a helpful depiction of the components which form a 'nexus', the means through which doings and sayings hang together and can be said to be coordinated (Schatzki, 1996: 90).

The 'hanging together' as used here suggests temporality of time while activities also serve as a context within which other activities occur. In making sense of these 'social activities' underpinning the practice of scenario thinking, the everyday activities that innovation teams engage to fulfil their roles come together to contribute to form the nexus of the practice. These activities are not to be understood as mere building blocks of the practice which are supposed to be enacted just for the sake of the practice, but their enactment is goal oriented and based on the experience and intelligibility of actors. The role of intelligibility, however, brings to fore the role of mental organisation in practices. Schatzki (2001) in accounting for practices and their mental organisation refers to mental phenomenon such as desires, hope, fear and anxiety as fundamental states of affairs that enable actors to cope with their involvement with the world. As such, expressed in behaviour, they inform activities by extending their understanding and determining what makes sense to people. Here, it can be argued that scenario thinking by virtue of being a disciplined knowledge driven process of imagining possible futures is conditioned by uncertainties, embodies capacities such as know-how and dispositions and centrally organised around shared skills and practical understandings. So in conceptualising scenario thinking as a social practice, the product innovation team members represents the actors with ontological priority been given to the human actors and those regular discernable patterns of activities that take place within the ambit of their praxis. Epistemological primacy is placed on the actors' quest to understanding the future performance of their innovation in the market-place with the

uncertainty characterising their working environments serving to condition the actors' behaviour and conduct (praxiology). Driven by these assumptions, we define Scenario thinking as the bundles of human *actions and practices* in context aimed towards *understanding the past and the future* in the present to cope with future *uncertainties* within the contingencies of the moment.

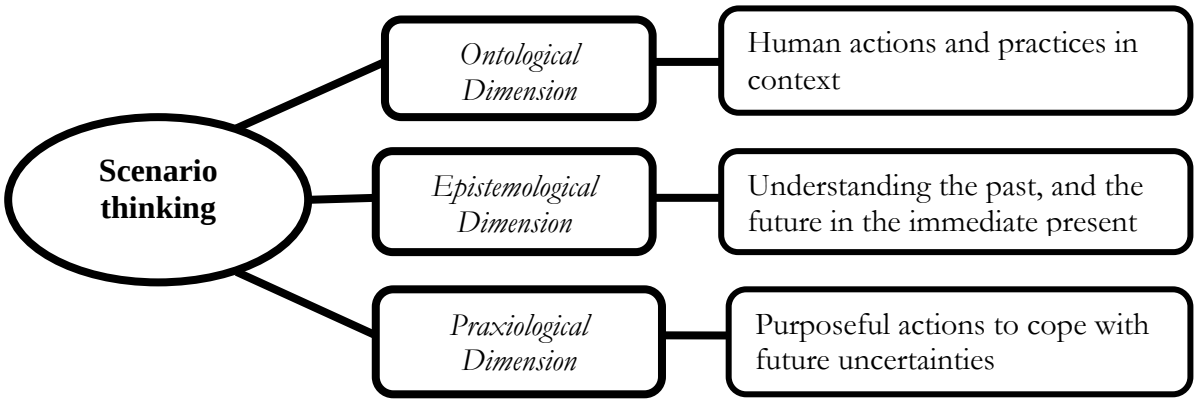

Figure 1- Scenario thinking as a social practice

From this perspective, scenario thinking as a social practice, we argue is an ongoing social phenomenon whose routines and activities are enacted on an everyday basis, sometimes with very little reflection, and also from an unintended action to an unintended outcome and on the spot. It continues unabated in as much as relations remain unexplained until anomalies are brought within the range of vision of innovation teams. In doing this in a dynamic generative way, teams may apply their collective understanding with all resources at their disposal, including those capabilities gained from their conscious individual experiences and collective psychic life. As a collective shared practice that is expected to permeate the everyday 'doings' of innovation teams, its enactment and engagement in practice requires emphasis on collective action, and shared understandings. Thus, the specific relational take on scenario thinking as advanced here is one that takes a critical look at the dispositional in-betweens rather than the isolated subjects or wider structuring forces. The practices therefore is conceptualised as flexible and durable as opposed to being stable or institutionalised.

A contextual process of 'way-finding'

The coming to presence of scenario thinking within everyday situated practice is perpetually idiosyncratic, amorphous and non-linear. It therefore relies on the interdependence of the social agents confronted with the challenge of imputing meaningful orders upon their social order. In our modest attempt to assemble the practice, four distinct phases which are clearly discernable as unique in character and purpose are proposed. The first stage is prospective sense-making which is fundamentally driven by individual disciplined imaginations induced by serendipitous events or a problem driven search. Following this is multilateral participation, a perceptually guided discussion. Next, is the creative application of analytical and technical rationalities underpinned by foresight methodologies and techniques to evaluate alternative and competing future possibilities. Finally the team enters the cooperation stage where they negotiate around a chosen pathway into the future. These 'durationally' indivisible phases are driven by ongoing abstractions, reflections, actions and concrete activities which together, help preserve the learning orientation of the practice (Jacobs, 2010). Also, the various phases while distinct in

character are nevertheless interwoven and interdependent on one another. The *durée* of the everyday actions and micro-interactions that come to define the various phases are connected across the different time levels of the past, present and the future.

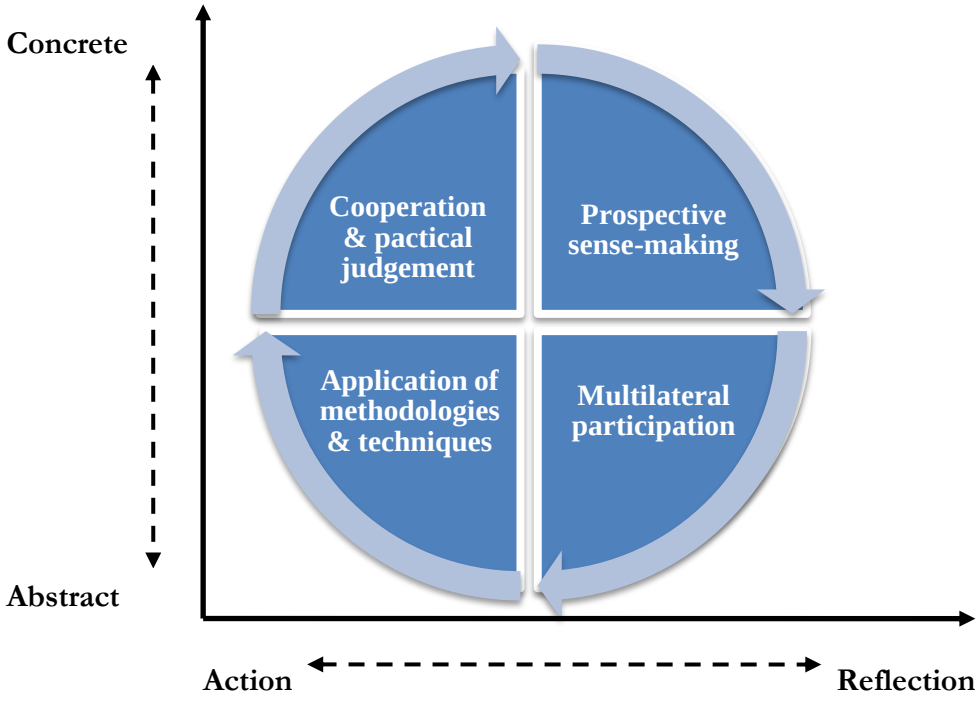

Figure 2- Scenario thinking in innovation teams

The various stages presented in the framework in practice are not only individually adaptive but also reveal a logical strategic connectedness that serves to preserve the meticulous requisite feedback mechanism that sustains the *becoming* character of scenario thinking. In reality, the phases are not clearly visible or defined but could only be identified as praxiological instantiations with reference to the sayings and doings of the collective engaged in their situated activity.

Phase-I Prospective sense-making

The emergence of scenario thinking in self-organised groups start with what we refer to as prospective sense-making. Whereas sense-making is a social process of identifying and interpreting contextual subtle cues to form salient categories that can be used to inform action and sustain meanings and identities, prospective sense-making does not only rely on past experiences (retrospection) but it is also driven by future expectations (MacKay, 2009). This is because the past is not only used to gain insight into the present, but extrapolated into the future with the aim of charting desirable future pathways. In this particular phase, actors scan the horizons of their environment to gather information on weak signals, identify focal issues, develop their own stories and evaluate their own assumptions on imagined futures. This they do by bringing into existence intransitive social structures and events which simultaneously enable and constrain their actions in the present. The enactment of prospective sense-making is often an automatic response to making sense of the evolving tensions between, problems definition

and an ongoing attempt by actors to gain insight through middle level abstraction across space and time.

Thus, the actors in articulating how they make sense of complex situations implicitly rely on their experiential and inferential knowledge, and treat time as a stream by employing both hindsight in the form of counterfactual reasoning and foresight to probe and gain insight into the present (Aaltonen, 2005). These recurrent patterns of schemas that result from these individual cognitive activities could be interpreted as a temporal, recursive and creative restructuring of existing social formation. Whereas sense-making under the traditional scenario thinking process relies explicitly on asking actors to think 'hard' about their desired future, prospective sense-making, we argue is not centrally guided or explicitly set in motion by a facilitator, but its emergence and final determination is a function of a series of interlocking contextual actions and micro activities in which actors engage. The actual starting point eludes systematisation, but the immanent emergence of the process is often an improvised response to specific pattern recognition or projection often triggered by a problem driven search or a serendipitous event.

Since scenario narratives are individual interpretation and constructs of possible futures that may be brought to a group's attention, invoked scenarios will have to open up a new schema with fresh detail(s) that has the potential of influencing the future before it could progress to the next phase of the process. Thus, they do not only need to be relevant, probable, plausible and coherent (Shoemaker, 1993), but should also be pragmatic, unique and more importantly be persuasive in improving the innovation strategy through qualitative cause and effect reasoning.

Phase- II Multilateral Participation

Multilateral participation is a perceptually guided process propelled by disciplined imaginations to bring possible futures into existence. It therefore provides a platform for the evaluation of ideas appearing as sensory images and the anticipated differential consequences of alternative and competing scenario narratives. This way, it acts as a forum for actors to share their anxieties, hopes, fears, and vague mental conceptualizations of their future expectations. The intensity of the free discussions may depend on the extent to which the scenario narrative challenge existing assumptions and mental models of team, the concreteness of the utopia, the novelty or disruptive nature of the idea and its anticipated impact.

While an anticipated future impact may constrain the feasibility or durability of a scenario narrative, ensuing debates would be future directed, open-ended, efficacious and driven by what can be described as cultural presuppositions and a mutually beneficial social interaction which in turn serves as a dynamic medium through which the actors actions and alternate 'visions' comes to presence. The recurrent inter-simulations and responses characterising the presentations of ideas or point-of-view are not just about people taking their turn to speak or just share their thoughts. Rather, proponents are expected to articulate succinct explanations, justifications and possible implications of their ideas regarding the future of the product. It is all about temporal structuring and restructuring of dispositions— that is, constructing scenario narratives capable of improving the teams' collective practice and their existing social order. While these open discussions may provide a means for teams to creatively synthesise what may sometimes appear

to be unrelated, competing and critical ideas into coherent versions of an emerging desirable future, it seems particularly important to note that peoples vested interests, particularities and political interests may influence their views and the resultant counter ideas and arguments they might put forward for consideration.

In order to produce the desired results, the team then has to move to the next phase, where identified possibilities in the form of propositions and conjectures are re-contextualised, 'tested' and evaluated to ascertain their viability in practice. Thus, the team adaptively advances to the next phase where the limits and effectiveness of ideas in-practice are ascertained.

Phase- III Application of methodologies and techniques

At this phase, effort and time is devoted to applying some 'foresight' methodologies and techniques to the prospective scenarios generated during the multilateral participation session. It borders on a live 'wind-tunnelling' (van der Heidjen, 1996) the range of plausible scenarios and imaginatively re-organising all perceived consequences into factual, relevant, and future-oriented "knowledge about the anticipated consequences of different actions" (Fuller and Loogma, 2009: 73). Under the auspices of traditional scenario planning, MacKay and McKiernan (2006: 97) describe this phase as a "formal testing for surprise, plausibility, internal consistency and gestalt" of the scenario logics by extrapolating the past and the future into the present. The choice of techniques for evaluating scenario narratives here may be reached through a brainstorming session where members share their views and images of the future. While historiography in the form of counterfactuals and scenarios in the form of statistics may be symptoms of the mental and interpretive schemes of team members, methods employed might be qualitative in nature. For example, possibilities might be frequently presented as probabilities, case probabilities may often be preferred over class probabilities that makes use of informal "simple low-hazard technologies" (Weick, 1993: 376). Notwithstanding, the transformative actions to be taken would often be evaluated on the basis of the project histories, available technologies and industry standards. The dynamics of the selection process and the declaration of a new future is what actually underlies and defines the next phase of the process.

Phase-IV Cooperation and Practical Judgement

Cooperation and practical judgement is the final phase of the practice of scenario thinking. In reality it is a momentary stage in an adventure as opposed to a destination and entails team members coming to a consensus by making practical judgement on a chosen pathway among the numerous alternatives at their disposal. At this stage a new pathway to the future is decided, declared and adopted. The declaration of the new future enables and empowers the innovation team to collectively allocate resources more efficiently. So in as much as the innovation team members may be very knowledgeable and familiar with the team's purpose, this stage helps them effectively to clarify, unify and articulate their purpose. In reality it is that which makes the group's action possible with respect to converting the narrative scenarios into pragmatic value. In other words it entails the movement from the scenario development to its implementation.

Note that the adopted pathway or idea at this stage may become legitimised and homogenised, enabling the team members to generate a shared interpretation and probably a common

language. Notwithstanding, this is the very point where differences in opinions and images of the future may become pronounced, sometimes resulting in deadlock. Individual fears, anxieties, and hopes at this stage are heightened and the Project manager's facilitating skills as well as the teams' existing cultural parodies tend to determine how these concerns are managed. The interesting thing about this phase is that it does not produce what could be termed an authentic closure of the scenario thinking process. This is because in embarking on the desired pathway a new future then is said to be declared which comes to presence with new problems and opportunities which are conditioned by environmental uncertainties. Actors, through prospective sense-making for example, may invariably come to identify these new opportunities within the broad vision of improving the innovation process and the future product. This is bound to happen because the desired future at this stage is not yet determined and as such will remain open and provoke strategic conversations capable of starting a causal chain until a particular possibility is actualised. Thus, the whole scenario thinking never comes to equilibration.

RESEARCH METHODOLOGY

We develop our contribution in the contribution in the context of the global software industry, where new product innovation is not only vital but fundamental to achieving competitiveness. We therefore adopted a qualitative case study approach for the study as we aim to "uncover meaning by analyzing rich, non-numerical information in a context of *[multiple cases]*" (Kim, 2006: 6). All the organisations were running more than one project at the time of data collection; so in order to improve the scope and generalisation of insights to be generated by the research, the following normative criteria were developed to select the projects included in the empirical inquiry:

(a) Project(s) should require the commitment of significant resources to be pioneered.
(b) Project(s) should entail the development or generation of innovative product(s) incorporating new or unfamiliar technology of the organisation and or marketed to unfamiliar users.
(c) Project(s) should employ Microsoft's technologies including their user and data interfaces in creating the platform architectures on which the products are built.

Table 2.0 is a summary of the individual project case histories. It shows the project team types adopted by the organisations, thus whether the team work permanently on the project until it is completed (stable membership), or whether membership has fluid team boundaries; individuals join for shorter periods when their expertise is needed (temporary membership). It also shows the product under development and the type of innovation being pioneered. The Interlab and Mercury projects were classified as continuous innovations because their new products under development were utilising existing core architecture, or what Meyer and Seliger (1998) referred to as product platforms. These were existing software products whose architecture was undergoing massive re-structuring and improvement to meet changing market trends and demands for derivative products. On the other hand the Kemitech projects were classified as discontinuous innovations as they were being built on new product platforms that required extensive writing and programming of the products' subsystems. Both products are expected to be the first of their kind to be developed in response to perceived market opportunities. The biographical sketch of the case organisations is also presented in table 2.1.

Table 2- The Projects attributes and case histories

Organisation	Project team type	Innovation type	Final product
Interlab	Temporary Membership	Continuous Innovation	Planning application Software
Kemitech	Temporary Membership	Discontinuous Innovations	Traffic congestion software/Train graph application software
Mercury	Stable Membership	Continuous Innovation	Investigation Software

Table 2.1- Biographical sketch of the case organisations

Organisation	Area of activity	Business sectors	Project selected for the research
Interlab	Development of specialist software applications and the provision of associated services in support of these applications.	Central and Local Government, Utilities, Emergency services, GIS & Spatial data management, Bespoke Management	Planning application software for a national sports agency
Kemitech	Bespoke software solutions, Internet technologies and applications development, Interface engineering, High integrity systems assurance services.	Central and Local Government, Defence Aerospace, and transport sectors.	Traffic congestion software for local government and a train graph application software for rail companies
Mercury	Sales and mobile retail management Solutions, Independent IT networks, Hardware, Investigative software and providing Consultancy on best-fit IT solutions.	Airlines, Railways, Intelligence Agencies, Law enforcement Agencies, Ferries.	Investigation software for the security services

Among the various qualitative data collection techniques employed for the study are; ethnographic interviews, observation and the analysis of organisation and project archival documents.

Ethnographic interviews

The main source of data collection was ethnographic interview (Fielding and Fielding, 1986), which allowed participants to express their thoughts and feelings and describe their own interpretive schemes with a rich detailed account of their experiences while sensing no intrusion. Here, "questions are considered, rephrased and analysed with interviewees so that they can discuss how they experience their work world and what kind of things are meaningful to them" (Dougherty, 2004: 40). After a participant was introduced to the background and aims of the research, the interview typically began with questions asking when the participant joined the organisation and to briefly relate how he or she came to be in their present position. This was aimed specifically to selectively reactivate the respondent's past patterns of thought and action (Emirbayer and Mische, 1998), which invariably would be routinely incorporated in their current practice. Most of the questions used to trigger answers during the interviews followed the "seven questions" as developed by Amara and Lipinski (1983) which they argue are fundamental to researching futures. Also four of Miller's (2007) criteria of pedagogy and storytelling were drawn upon to guide the narratives of participants to elucidate their views about their preferences and expectations of the future in an operationally useful manner. These included:

(a) Probing the story towards 'strategic imagining' as opposed to optimisation testing, a comedy, thriller or romance. By this, actors are encouraged to freely articulate their uncertainties and perceptions about the cause of those uncertainties.
(b) Defining a specific time span for the story to cover the commencement of the project to the present extending to the foreseeable future.
(c) Seeking clarifications of the actor's point of view to cover the choices people make in their everyday lives (micro activities) with reference to the new product development process.
(d) Encouraging the agents to expatiate on how they employ scenarios to assist in making everyday choices with reference to the product innovation process.

On average the interviews lasted for an hour. While the interviews were tape recorded, mental notes were simultaneously made to enable the further probing of participants to shed more light on important events. These 'repetitive' ethnographic interviews provided what Van de Ven (1992: 181) referred to as a "comparative-static observations" of the practice of scenario thinking over time. The data obtained from the ethnographic interviews were later transcribed and analysed.

Observations

Observation as a method was employed to collect data on how the research participants engage in the actual and situated activities underlying the practice of scenario thinking. It was used to unearth, if applicable, some tacit rules that have never been observed nor codified in the literature on product innovation and scenario thinking. Key project meetings served as the 'social sites', where the observation data were collected in real time. Apart from collecting data by observing and recording meeting proceedings, the researcher did not take any other active role in these meetings. The adopted 'passive' role enabled the researcher not to 'influence' or interrupt the free flowing proceedings and record and impute meanings to almost all bodily doings and actions of the participants in context. The observations were supplemented with tape recordings of the conversations and open ended narratives among the group during the meetings, which

served as a source for the clarification of some important verbal patterns of their communications. These meetings lasted between forty-five minutes to two hours.

In the early days of the research some anxiety arose among some participants as they experienced the research as a form of intrusion and were very curious about the research intention. Frequent informal discussions and conversations with members of the innovation teams were used to diffuse and allay their 'fears' thereby reducing the psychological distance between the participants and the investigator to the barest minimum (Schwartz and Schwartz, 1955). The spatial open-planned offices in which these teams often worked contributed greatly to these informal 'corridor' discussions and conversations which continued throughout the data collection period and often centred on the projects and the agents situated activities in practice. It did not only help to improve relations between the researcher and the researched but also served as a tool for the identification of recurrent discourse features capable of extending our understanding of the relation between the linguistic form of such texts and the broader social and cultural world in which they were produced.

Archival materials

Multiple documentary sources were employed to gather information on the organisations and their projects. Relevant organisational documents of interest were downloaded from the organisations internet web pages. Those that were not available on these internet web pages (e.g. internal project management policy documents or formal methodologies used for the development process were obtained upon request. These documents helped us to understand how project specifications and organisationally promoted canonical routines may have effectively contributed to the transformation of the linguistic "habitus" (Bourdieu, 1990: 53) discourse observed during practice. The documentary texts were also used as a tool to assert transparency and support claims about the 'native's point of view' and the validity of our interpretation.

Table 3- Summary of Data Collected

Organisation	# Innovation Team Members	#Interviews/ Observations Conducted	Archival Sources
Interlab	8	8 Interviews, 3 Observations	Electronic share point, internet pages, project records
Kemitech	7	7 Interviews, 3 Observations	Newsletters, internet pages, project records
Mercury	11	11 Interviews, 4 Observations	Corporate brochures and internet pages, project records

Data analysis

As scenarios are narratives or stories about plausible futures, we identified banal narratives that exhibited spatial and temporal order like stories to capture the actors lived experience from the interview data. Following this, we used Labov's (1997) sociolinguistic structural model to evaluate and analyze the narrations in their entirety. In doing this, primacy was given to those scenarios that often "raised questions of possibility, impossibility, necessity and contingency" (Booth *et. al*, 2009). Hendry and Seidl (2003) recommended framework for analyzing strategic episodes was mainly used to analyze the archival and observation data. The gathered data were then triangulated and pulled together as a whole, analyzed and interpreted continuously and iteratively until common themes emerged and became saturated. In analyzing the triangulated data in practice, we followed Richie and Spencer's (1993) qualitative data analysis framework making minor modifications of the process in response to some of the salient theoretical and methodological commitments.

FINDINGS

The practice of scenario thinking in the various innovation teams did not start in response to a particular managerial cognition or an explicit rule to look out for opportunities and risks in the competitive environment. Rather, the enactment of mundane activities that could be characterised as oriented towards the understanding of the future through the teams own collective efforts in responding to their organisations working processes as well as their environmental and flexible contextual clues. Driven by actors' perceptions, propositional knowledge, experience and intelligibility, these ongoing activities and practices are what come to shape, constrain and enable the construction of knowledge that underpinned the practice. We identified specific 'practical logics' which give rise to the prevailing patterns acknowledged as the fundamental site for the generation, evaluation and synthesis of the generated multiple alternative futures. These logics which anchors the practice, are made up of different elements which together form the set of "structuring dispositions" (Bourdieu, 1990) were identified. These include the ongoing human social interactions, flexibility through improvisation and the temporal emergence of human agency which interrelate, shape and reinforce one another's reproduction to serve as the fulcrum or the nexus of the practice in the various innovation teams.

Human and material social interaction

The sustenance and advancement of a shared practice as argued by Barnes (2001), rest on the effective participation of actors in the practice. It therefore requires actors to continuously interact with one another in context. Ongoing interactions therefore comes to serve as a vehicle for the sharing of the knowledge and experience accumulated by the various actors in their situated practices as it clearly characterises the entire scenario thinking practice as observed in the teams. These kinds of mutual interactions were influenced not only between individual team members but more importantly, between the individuals and their material environment. However, across the various teams the frequent project meetings came across as the fundamental site where interactions were at their peak. Thus, they provided the platform for individual members to maximise their existing knowledge of the innovation strategy by converting any new knowledge or insight assimilated from others into something meaningful.

> ***Interlab team member:*** *What you often find in the meetings is that although there is generally points we go through, there's a bit where it is an open forum, so someone can bring something to the whole group, or someone might just say something going round what they have been working on or express their frustration or something in the back of their minds.*
>
> ***Kemitech team member:*** *Because we are a very small firm, so we the developers are sort of all downstairs. We are fairly close together. We sometimes have a more or less formal team meeting upstairs where we can use the white board and stuff to discuss the overall project. But certainly when we are working downstairs we are in almost constant communication. If someone needs help with something, you just have to give a shout. So this kind of interactions is really a continuous thing.*

It should be noted here that the interactions go far beyond the conventional threshold of information exchange in teams to focus also on interactions with the artefacts which mediate these interactions. Thus, as the artefacts mediate these interactions the actors in turn interact with these artefacts collectively as well as in their individual situated contexts when they engage in their situated activities. Through these ongoing interactions their perception and actions are focused on the information in their environments and they use this information to solve their problems, reflect and share 'good practice'. In this sense they collectively embark on creative efforts when there is scope for improvement on their practice. From this perspective the practice becomes established through this kind of mutually beneficial interaction between the various actors and their artefacts.

Flexibility through improvisation

The logic of flexibility through improvisation is oriented towards the idea that scenario thinking as practiced in the teams is not about formal structured planning or a linear evolution, but an ongoing adaptation to meet changing environmental demands. It first comes to fore through the flow of interactions often punctuated with adhoc responses during team discussions. Flexibility here depends not only on the social and physical environment which prescribes the space of possible action but more importantly on the desire of actors to improve their practice by remaining open to numerous possibilities. Scenario scholars (e.g. Korte and Chermack, 2007; MacKay and McKiernan, 2006) have gone a great length to codify methods or prescribe standardised tool kits of techniques which can be exploited to improve scenario thinking. However, variations in context and contingencies always require some form of improvisation on the prescribed tools to make them usable. It all comes down to adaptation and improvisation of micro level activities as dictated by the context and by human agency. So for example, instead of developing a pessimistic scenario , an optimistic scenario and an expected scenario to initiate strategic conversation as dictated by traditional scenario planning, a single optimistic scenario narrative as invoked by any member of the innovation teams' was often enough to set the team in motion.

In this case, the coming to presence of scenario thinking in the project teams does not necessarily start from prospective sense-making, nor are the activities undertaken by the teams in the identified phases set in stone. The logic as described here bears resemblance to the everyday routine adaptation of organisational canonical rules and procedures by actors whenever they encounter ambiguities in their situated practice (Orr, 1990; Barley, 1986). This inherent flexibility in the practice is what makes it possible for actors to constantly update their practice and

improvise to meet local demands. Thus, actors opportunistically combined activities or techniques which may lead to a better understanding of the full range of future alternative possibilities. The refinement of existing scenario techniques along with the addition of new ones in response to local contexts may in turn lead to improved understanding which then serves as a precursor to developing effective actions in the future. As argued by Spinosa (2001), all practices, regardless of the explicit intentions of actors over time, undergo transformations leading to the addition of new practices to the core ones. While the additional evolving practices developed here are shaped by the ongoing interactions and reflections that occur in practice, the resulting core practices in turn shape future interactions and reflections which sustain the practice. In sum, it is argued here that flexibility through improvisation is what makes the practice of scenario thinking extremely adaptive in fast changing competitive contexts.

Emergence of human agency

The starting point in accounting for the temporal emergence of human agency as a logic of scenario thinking is to understand how the agentic powers of the innovation teams endures trans-factually. By creatively challenging the constraints imposed on their actions, they are able to reconfigure the very structures that enabled them to challenge their own beliefs and assumptions. The new social orders produced by this process often gave rise to both coherence and contradictions in alternative pathways. Human agency manifesting through pattern recognitions and projections drives imagination and the selection of a pathway from identified multiple future possibilities. Reinterpreting this conceptualisation of agency, the organised human capability to explore technologies to exploit present and future market opportunities is temporal and covers both historical and projected future problems. The common factors of fear, hopes, anxieties and fantasies were often exhibited by team members, which acted as a stimulants that buffers the 'aspiration' or 'will' of the innovation teams to exercise power over their technology and also link them to complex and volatile market opportunities.

In accounting for the logic again, the focus is on collective agency and a team's capacity to foresee, prepare and transform their existing social order. Thus, the emphasis is on the collective working practice which becomes a prerequisite for acquiring embodied capacities such as knowledge, understanding and skills among the actors. To extend our understanding of the emergence of human agency as a logic of scenario thinking, consider the following informal conversation that ensued between a Mercury team member and the researcher during data collection:

> ***Researcher:*** *So what is it you are doing now that you think will contribute to the make or break of the product in the market?*
>
> ***Team Member***: *Well, not to blow my own trumpet, I am currently working on 'validators' at a sort of object level which will hopefully be very useful for customers so that they will be able to modify their business logs without having to come to us to say, I would like it if it did this, this and that. I have got a feeling that kind of functionality is probably going to be quite a big selling point if it is done properly. There is a decent interface and they have got people in position to come up with business rules and say I would like that, that and that.*

Researcher: *Sounds interesting, did you come up with the idea yourself?*

Team member*: The technical director originally had a sort of vague, fluffy idea, it would be nice if we do this, this and that and I stumbled into it, because I got bored of going through every one of my pages where one date needs to be less than another date that somebody has put in. Currently all we've got are 'validators' that say this date has to be before Wednesday or this date has to be before now. There is no way to say this date has to be before this other date. So I was fiddling with 'validators'. I then discussed with the technical manager who said yes I thought it would be a good idea if we made evaluators at a higher level that could look at all the attributes of the object.*

Researcher: *What is actually going to happen after this?*

Team member: *Well, I saw a problem or at least an opportunity, checked with the technical director and the project manager that something needs to be done. I was given a free reign to go off and implement it and make it something useful. It's very much sort of a technical bit at the moment, once the technology is there, it will be up to the team to take it on. We actually will then know how much time we need to spend putting these rules into the system. Maybe at the moment, all we need is the ability to do it for a few fields like comparing dates.*

This bit of dialogue illustrates the strategic role of intuition in the practice of scenario thinking, but more importantly, it emphasises how the temporal emergence of human agency becomes efficacious in the reproduction, transformation and change of social order. The temporally embedded actor on receiving thought categories from the technical director basically engages in retrospective as well as prospective acts as he draws on his existing technical knowledge to construct a yet-to-be-realised future. This future would have never become a reality without the actor engaging with it. So on the way to making the 'validators' useful, the actor creatively 'fiddles' with the 'validators' to make them useful. However, fiddling does not automatically produce results or guarantee mastery over future possibilities. It entails projective imagination and evaluation of an array of possible options and possibilities until a possible path of action reveals itself. The road to identifying this possible path of action is not linear as described by the actor. In practice it is about trying the viability of the individual options available to the actor. This process is punctuated with successes and failures until a pragmatic possible path is identified. The dialectic between these successes and failures is what Pickering (1993) referred to as the mangle of practice which contribute to the temporal emergence of human agents in their situated practice. The challenges presented by the fast-moving environment in which all the organisations understudy are embedded required the innovation teams to think in real time. This is because the future of their products just as their practice are not only open ended but also indeterminate.

CONCLUSIONS AND IMPLICATIONS

The fundamental objective of this paper was not to develop a grand theory of scenario thinking but to move beyond the traditional episodic intervention paradigm to present a systematic account of the emergence of the practice in self-organised groups (product innovation teams). In this regard, our goal was not to replace the existing paradigm of scenario thinking, but to chart an alternative interpretive lens to extend our understanding of actors' actions and behaviour at the micro-level, and how they contribute to the development and sustenance of the practice

across space and time. The research therefore has several benign implications for managers, especially for those working in software companies and other technology-intensive organisations.

First and foremost, viewing scenario thinking as a social practice in constant flux and transformation helps us to refine our view on how to harness and nurture the practice in product innovation teams. Given the emergent nature of scenario thinking, managers need to understand that in their fast-forward environment the present and the future can never be neatly divided between the here-and-now and the unknown beyond. It is therefore not only myopic but also potentially 'suicidal' to simply view scenario thinking as an episodic intervention or a formal process to be facilitated only with the help of an external management consultant.

If well managed scenario thinking could provide a unique platform for developing individual resourcefulness, creativity and quality reasoning which managers could employ to evaluate organisational members sentiments, fears, anxieties, and, or expectations of an ongoing project. It also suggests that the cultivation of scenario thinking in product innovation teams could serve as a means of enhancing the 'democratisation' of organisational pervasive innovation processes. This way, innovation team members will be enthusiastic in taking up ownership and responsibility in exploring in details the limits and potentialities of their product or system capabilities, especially during the development of technical system requirements in complex and fast-changing environments.

Limitations of the Research

This study offers several insights into the cultivation of scenario thinking in self- organised groups, but these are tempered by some limitations. Firstly, the findings from this research are based on qualitative in-depth studies of three innovation teams embedded in different organisations, engaged in the development of four different products. While the findings and all evolving theoretical steps were reached by making linkages between emerging categories and concepts, the research could not establish that these findings are generalisable to all software organisations or to other technology based firms. Clearly, the decision to give primacy to the product innovation teams and their relationships, interactions and situated activities may not be popular in contemporary management research. This is because that increases the tendency or possibility of attributing 'everything' to the innovation team, while discounting top managers' role in the cultivation of scenario thinking in these innovation teams. While a modest attempt was made to justify these methodological choices, our thesis may have ended up raising some of the old and broad philosophical questions related to the locus of knowledge, power and what counts as practices.

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Appendix: Overview of the ethnographic interview themes

(Questions were tailored specifically according to agency, issues and the individual's position in the innovation team)

- Background of Interviewee
- Background of the team and their project:
- Important decision currently been made by the team
- Interviewee's perception of the product under development

• Interviewee's perception of the teams working practices and the innovation process:
• Interviewee's perception of the processes and systems in place that helps the team
• Interviewee's views on constraints and challenges facing the team
• Interviewee's view on the customers, competitors and changes in the business environment

• The Seven trigger questions*:
1. If you could pose three questions to a trusted clairvoyant who can foretell the future of the product under development, what would you ask?
2. What are some of the pivotal events from the past few years, months or days that you think provide good lessons for the future of the innovation team and the product under development?
3. In the best possible world what would you hope for? Interviewee's are asked to paint an optimistic but realistic scenario.
4. In the worst possible world what are your greatest fears with respect to the product under development?
5. What are some the things you think as a matter of urgency could be done soon to improve the development process and the product as a whole?
6. Assuming all constraints and challenges facing the team are removed, what are some of the suggestions for improvement you would like to implement?
7. Please consider the situation in the future when you will have to moved on from your current position, to the next job or retirement, what do you hope to leave behind that people will associate with your period in office. What do you want to be remembered for?— It was suggested to the participant to try in his/her mind to remove all constraints; imagine she is in total control, and only personal value will shape their response.

**Original Source*: Amara and Linpinsky (1983) with adaptation from MacKay and McKiernan (2009), Ratcliffe (2002) and Van der Heijden (1996).