Implementing best practices to support creativity in NPD cross-functional teams

Implementing best practices to support creativity in NPD cross-functional teams[1]

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Abstract: The use of cross-functional teams increases creativity in new product development leading to shorter development time and higher product innovativeness. Research in new product development has identified a number of organisational practices associated with supporting organisational creativity in cross-functional teams including frequent and open communication, building organisational slack, attitude to risk and top management commitment. Using a single case study approach, this paper explores the challenges associated with the implementation of such organisational practices in the R&D department of a large telecommunication company. Challenges include sequential involvement of functions in the team, broken communication between different teams, management attitude to resource constraints, and short term management focus on incremental innovation.

Keywords: new product development, cross-functional teams, time to market, product innovativeness

1 Introduction

This paper examines the approach to building creativity in cross-functional teams (CFTs) in new product development (NPD) in order to accelerate the time to market and improve long term product success. The use of CFT in NPD has been associated with higher process performance (Brown and Eisenhardt, 1995), in particular increased speed of development (Griffin, 1997; Tatikonda and Montoya-Weiss, 2001) and with overall project success (McDonough, 2000), and organisational performance (Song *et al.*, 1997). The positive influence that the use of CFTs has on increasing the speed to market and project success in NPD can be explained by the greater information diversity made possible by wide cross functional involvement (Griffin, 1997). The use of CFTs generates a greater variety of information to be taken into consideration in NPD decision making, which in turns leads to greater problem-solving creativity (Griffin, 1997). Griffin (1997) suggests that it is this higher creativity that explains why using CFT reduces the time it take to develop newer, more radical products. Radical product development requires greater creativity to deal with increased problems and issues that come about from the

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lack of prior knowledge that characterises radical product development. Similarly, it might be the greater creativity made possible by the use of CFT that enables their use to reduce the development time in environments characterised by higher turbulence (Buganza *et al.*, 2009). In such environments there is little prior knowledge of the market and technological configuration which may explain the link between the use of CFTs and speed of development.

Existing literature identifies a number of practices that are useful to support creativity in NPD CFTs (Alves *et al.*, 2007; Vissers and Dankbaar, 2002) including building in organisational slack, and support open and frequent communication among team members (Bessant and Tidd, 2007; Tidd *et al.*, 2005). More widely, there is a large body of literature identifying the best practices in NPD (for a review of the literature on best practices in NPD see Ernst, 2002). Although widely prescribed both in academic and practitioner literature (Cooper and Kleinschmidt, 1996), the organisational adoption rates of these best practices vary widely (Dooley *et al.*, 2002). One reason for this variation may be related to the difficulties associated with implementing these best practices in organisations. Over 10 years ago, Bessant and Francis (1997) highlighted the need for a better understanding of effective implementation of NPD practices, in particular "*how a particular organisation can articulate and embed the necessary behaviour pattern and accompanying structured and processes needed to make good –practice NPD work for them*" (pg. 189).

The objective of this paper is to examine the implementation of some of the best practices associated with the use of CFTs in NPD to support greater creativity. The paper sets out to explore the adoption of a number of practices in a particular organisation and to reveal the challenges associated with their implementation. The findings of this study shed some light on the constraints that organisations face when adopting such "best practices" to support creativity in CFTs to promote faster development time and increased product innovativeness, as well as providing some indications to managers of how to deal with these challenges.

The structure of the paper is as follows. The first section identifies some of the practices associated with supporting creativity in NPD to accelerate the time to market and improve product innovativeness. The second part explains the research design employed in this paper. The case study and the practices adopted within the organisation are explored in the third part. The fourth section identifies the challenges associated with the implementation of these practices in the organisation under study. The last part identifies and discusses some tentative conclusions & practical implications.

2. Speed to market in NPD and the use of CFT

During the last 20 years, the accelerating pace of change has increased the emphasis that businesses place on reducing NPD times. First to the market strategies and time-based competition have been touted as the main routes to success in a range of industries (Stalk, 1988; Stalk and Hout, 1990), increasing the pressures on organisations to accelerate their development time (Menon *et al.*, 2002). However, the link between NPD time and product and/or organisational performance has been elusive. While some researchers report positive associations between the reduction in the time taken to develop a new product and the probability of product success in the market (Afonso *et al.*, 2008; Lynn *et al*, 1999), most research find that the relation between development time and

organisational performance is more complex (Griffin, 2002; Ittner and Larcker, 1997; Tatikonda and Montoya-Weiss, 2001). Research has shown that simply accelerating development time will not translate in product success and competitive advantage in the marketspace (Ittner and Larcker, 1997). A range of studies have identified significant trade offs between development time and development cost and product performance (Bayus, 1997; Rosenthal and Tatikonda, 1992). Similarly, research has shown that a first to the market strategy emphasising speed of development is not optimal in all circumstances (Bayus, 1997). Speed to market seems to be critical in situations in which organisations operate in turbulent environments, where being late to the market increases the risk of obsolescence because of fast changing conditions in the market (e.g. competitor activities or shifts in customer demands) (Tatikonda and Motoya-Weiss, 2001).

More importantly, the link between speed to market and organisational performance seems to be mediated by organisational practices, in particular the adoption and use of CFT (Ittner and Larcker, 1997). Ittner and Larker's (1997) study shows that across a range of industries, organisational performance is a function of the interaction between development time and organisational practices, with some organisational practices acting as enablers that enhance the benefits from development time reductions (in particular CFT and the used of advanced design tools) and others acting as suppressors that reduce the potential gains (in particular reverse engineering). Consequently, the use of effective CFT increases the positive effects that these time reductions have on organisational performance (Ittner and Larcker, 1997).

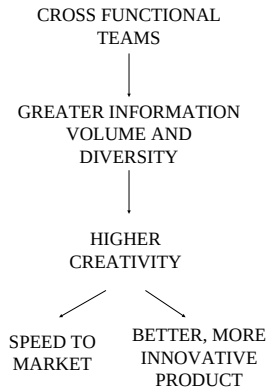
2.1. The use of CFT in NPD

The use of CFT to speed up the NPD process has been widely documented in the literature (McDonough, 2000). The CFT's multidisciplinary character enables team members to integrate diverse knowledge sets and skills allowing for the creation of rich, novel combinations of ideas (Alves *et al.*, 2007). CFT also foster inter-functional communication and cooperation, which leads to greater success (Ernst, 2002). One of the most common problems of CFT is that different functions end up seeing the same information through different lenses, leading to misunderstandings and conflict, and ultimately undermining process performance by reducing group cohesiveness and increasing job stress (Keller, 2001). The difference between successful and unsuccessful CFT is not however whether these communication problems occur or not, but in the way in which they are overcome. In successful CFT, the team members combine their perspectives in a highly interactive, iterative fashion, which increases information content ultimately leading to effective intra-team communication. Unsuccessful CFT approach development in a sequential manner, so that each functional groups ends up dominating a particular phase of the project (Dougherty, 1992). Successful CFT that manage to achieve higher development time reductions also meet more regularly, rely more on informal forms of communication to increase idea exchange, and tend to be co-located (Mabert *et al.*, 1992).

The functional and discipline diversity that characterise successful CFT increases the amount and diversity of information available to develop new products. Such information diversity not only fosters creative performance (Jackson *et al.*, 1995; Payne, 1990), but also aids decision-making helping the NPD team members to identify and correct mistakes early in the process – such as manufacturing difficulties or market mistakes –

leading to better product quality and saving time by reducing the need to deal with these problems later (Brown and Eisenhardt, 1995; Gupta and Wilmon, 1990; Imai *et al.*, 1985; Keller, 2001; Song *et al.*, 1997). It is this greater creativity that allows the use of CFT to speed up development time, especially in situations where prior knowledge is scarce, and to encourage the development of more innovative, radical products (Griffin, 1997). The link between CFT, speed to market and innovative products is shown in Figure 1.

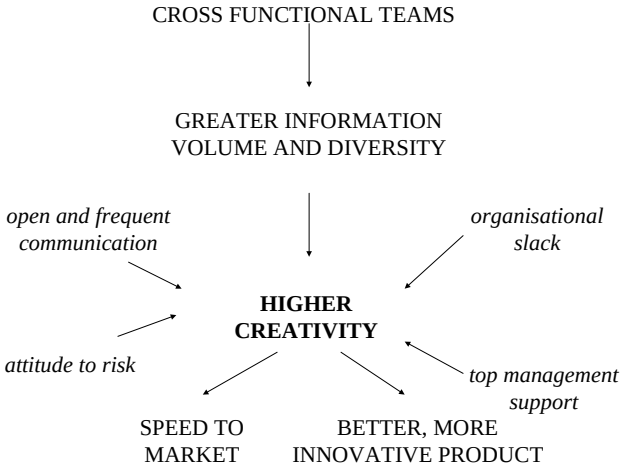
Figure 1 CFT, creativity, speed to market and product innovativeness



2.2. Best practices to support creativity in CFT

CFT are perceived as being more creative than non-CFT because wide functional involvement exposes team members to greater information diversity. However, simply increasing the volume and diversity of information is not sufficient to increase creativity. A range of organisational practices need to be in place to enable team members to exploit the team's creative potential. Such practices are related to the particular organisational culture, structure, and processes (Alves *et al.*, 2007; Sethi *et al.*, 2001) (see Figure 2).

Figure 2 Stimulating creativity in cross functional teams: the role of contextual factors.



Open, frequent and accurate communication (see Figure 2) among team members increases the volume and diversity of information shared, reduces misunderstandings and builds job cohesion (Keller, 2001). More accurate and diverse information improves the quality of decision-making and increases a team's absorptive capacity in that they become better positioned to understand and process the information that is being conveyed. Creativity is encouraged and higher productivity and a faster pace of development in NPD is achieved (Dougherty, 1992; Brown and Eisenhardt, 1995). One of the most effective ways through which managers encourage effective communication among CFT members is through collocation (Swink, 1998). However, research has also shown that open communication becomes a critical enabler of success in CFT especially when the team members are not co-located (Cormican and O'Sullivan, 2004).

The extent to which the team is encouraged to **take risks** (see Figure 2) affects the willingness of the team to pursue untried ideas (Bessant and Tidd, 2007; Sethi *et al.*, 2001). Existing studies have shown that the extent to which the team is encouraged to take risks is a key variable that positively affects product innovativness (Sethi *et al.*, 2001). It has also been suggested that an organisational climate that encourages team members to take risks and does not punish mistakes when something does not go according to plan improves the NPD process (Cormican and O'Sullivan, 2004), especially during idea generation (Bessant and Tidd, 2007), by reducing the time to market (Starr, 1992). For example, only by encouraging risk taking do organisations learn how to avoid errors and mistakes in the future, ultimately accelerating their NPD processes (Starr, 1992). Willingness to take risks also encourages fast decision making which speeds the NPD process (Menon *et al.*, 2002). Therefore, encouraging risk taking in CFT supports creativity and fast decision making, especially during idea generation, leading to higher product innovativeness and shorter development time.

To enable higher creativity, CFT members also have to have appropriate support in place both in terms of having "idea time" i.e. a necessary level of organisational slack (Bessant and Tidd, 2007) and in terms of having top management support, primarily in the form of a long term vision that would enable these ideas to develop beyond the early conceptual stages (Tidd *et al.*, 2005).

Organisational slack (see Figure 2) refers to the difference between the resources currently needed and the total resources available to an organisation. When there is little

environmental uncertainty, for example when a firm operates in a stable market, too much organisational slack represents a static inefficiency. When firms operates in dynamic markets which require innovation and change, slack can act as a shock absorber, allowing scope for experimentation (Bessant and Tidd, 2007). Providing the appropriate level of organisational slack – by providing employees with "idea time" to help in generating innovative ideas and by supporting the development of these ideas into innovative products to generate commitment and involvement in the innovation process – is therefore associated with more creative organisations and with higher performance in NPD (Bessant and Tidd, 2007). Allocating people to too many projects, while expecting the representatives of marketing or manufacturing on the CFT to do "their real job" in addition to working on NPD projects, has been found to be detrimental to new product performance (Cooper and Kleinschmidt, 1996). Lack of resources committed to NPD was found to be one of the major reasons for delays in NPD (Gupta and Wilemon, 1990). According to Gupta and Wilemon (1990), part of the problem associated with lack of sufficient organisational slack can be attributed to the lack of top management support for innovation.

Top management support (see Figure 2) is critical not only to the development of successful NPD processes (Cooper and Kleinschmidt, 1996), in particular speed of and productivity of development (Brown and Eisenhardt, 1995), but also to the building of effective CFT (Song *et al.*, 1997). Song *et al.* (1997) found that top management support plays the key role in determining the degree of cross-functional integration within NPD. This, in turn, positively influences new product quality and development cycle time. Gupta and Wilemon (1990) also found that management support in terms of financial and personnel resources allocated to NPD were the most important forms of support to accelerate NPD time. Top management support is essential to obtain the political and financial resources necessary to attract appropriate members to the team, to gain approval to pursue innovative ideas and to provide the necessary resources to foster the development process (Brown and Eisenhardt, 1995). Lack of strong top management support means more time is required to negotiate access to resources adding to delays in the process.

Exploratory research into the challenges associated with the acceleration of NPD found that lack of senior management support, in particular low priority given to NPD projects, unrealistic expectations, and short term orientation, were seen as major reasons for product development delays (Gupta and Wilemon, 1990). NPD projects pose a particular challenge to senior management because of the need for resource allocation between different new product ideas. On one hand, the development of new innovative products takes time, is highly uncertain, and the returns may not emerge quickly. This development requires "patient money" to support a long term NPD programme (Bessant and Tidd, 2007). On the other hand, stakeholders, via top management and the sales and finance department, require fast returns on their investment. Therefore, short term financial criteria are used in assessing NPD success and allocating resources to new projects. The role of senior management is to balance this tension between the demands for shorter term gains versus the long term pressures for technology & product development plans of the R&D department. An exclusive focus on short term, incremental project has been found to have a negative implication on organisational performance (Cooper and Kleinschmidt, 1996). One way of dealing with this problem is for the senior management to focus not only on returns on investment (or sales) when deciding resource allocation, but on other considerations such as future market

penetration and growth (Bessant and Tidd, 2007), or on strategic benefits that might accrue from having a portfolio of inter-dependent products. It is this long term commitment to major projects, as opposed to seeking short term financial returns (Bessant and Tidd, 2007), that enables the R&D department to focus on long term technology development. Senior management's long term commitment and supportive attitude towards innovation and NPD were identified as key to eliminating delays in NPD (Gupta and Wilemon, 1990).

The effects of CFT and the range of enabling factors for creativity in NPD and ultimately for the success of NPD (Brown and Eisenhardt, 1995) are described in Table 1.

Table 1 NPD practices regarding innovation and creativity and linkages to product success

Practice	*Effect on NPD*
cross functional teams	information volume and diversity => speed in product development
frequent communication	information quality and volume => speed & productivity of product development
organisational slack	ability to generate innovative ideas => support the development of innovative new products
long term top management commitment to major projects	process performance (speed and productivity of product development) + the development of innovative new products
attitude to risk taking	ability to generate innovative ideas + faster decision making => product innovativeness + speed of product development

While the literature identifies these "best practices" and advocates their adoption within organisations, little research has been undertaken to examine the process through which organisations attempt to implement these practices. Dooley and Johnson (2001) for example note that due to the strategic importance of NPD, change initiatives in this area are perceived as highly risky, and tend to be characterised as incremental change, with a top-down approach, broad scope, and cross-functional representation. A more recent study by Cormican and O'Sullivan (2004) develops a model of NPD best practice in turbulent environments, and their case study analysis identifies some of the issues associated with implementing this model in organisations, such as the need for an infrastructure to support open communication. However, their analysis focuses more on identifying the best practices and developing a tool to assess them, rather than on discussing the challenges associated with implementing these practices within organisations.

Using a single case study, this paper examines the challenges faced by the organisation under study in trying to increase creativity in their CFT in order to reduce the time to market. Each of these practices is discussed in relation to the organisation under study in Section 4. The next section discusses the design of this research.

3. Research design

This paper follows a single case study research design. The analysis is interpretative. Semi structured interviews were used for data collection. Ten interviews were conducted in October 2007 with R&D management team members and other employees from related functions within the business unit. The list of interviews is presented in the table below.

Table 2 Respondents

Respondents
Acting Head of the Business Unit & Head of R&D (management team)
Country Head of R&D Software (R&D management team)
Head of Technology (R&D management team)
Head of Quality (R&D Management team)
Site Head of R&D Software (R&D management team)
Program Manager (leading the product CFT)
Product Development Manager (member of CFT)
Software Engineer (member of CFT)
Representative of Business Development (member of CFT)
Representative of Sourcing (member of CFT)

With one exception where permission was not granted, the interviews were recorded and then transcribed. Notes were also taken during the interviews. A report analysing the NPD was send back to the unit for verification.

Data analysis involved deductive coding and narrative building. A list of codes was developed prior to the data collection, based on the literature review. The list was refined constantly during data collection and data analysis, following an iterative process. Based on the codes, data reduction and exploration followed using data displays (Miles and Huberman, 1984). These displays led to the construction of case narratives which provided the input for the next section.

4. The case study

The organisation under study – HEA - is a relatively small business unit of a large telecom company. Within the HEA unit, R&D is the largest department, with circa 250 people employed out of the total 300 within the unit.

In HEA R&D, the overall NPD time is very short, varying between 1 to 3 months for simple products up to 12 to 13 months for new complex products. Speed to market is a key driver of product development due to the dynamic nature of telecom market segment in which HEA operates which is characterised by hectic demand and short product development life cycles. A change in management two years before the data was collected focused attention on reducing the delays in development. In the past two years, as a result of the change in management, the unit achieved “0 slip” – i.e. no delays – in project execution.

Stimulating creativity and innovation in NPD using cross functional teams

HEA R&D adopts a cross-functional approach both to idea generation and to actual product development. During the idea generation stage, product ideas are discussed during a cross-functional workshop which helps generate a multitude of product ideas. To improve the performance of the pre-development activities, the unit has recently implemented a new approach to organise the idea generation stage by attempting to involve all relevant functions in the process. Generally, however, the involvement of all functions in the idea generation stage has been limited due to lack of resources and poor communication between the functions. For example, the limited involvement of R&D Software & Hardware during idea generation was explained based on the significant resource strains under which R&D operates, meaning that it was physically impossible for the R&D expert representative to take part in all workshops. The consequence of such a limited involvement was discussed in terms of limiting the quality of the product concepts developed at this stage. Poor communication and lack of goodwill explained the limited involvement of Industrial Design representatives, which led to further delays in the process.

During the actual development phase, a cross-functional product team is set up to manage product development, ensuring that the team has access to a diversity of information to aid decision-making. Generally, the involvement of the various functions in the team varies depending on (1) the type of products (new vs. variant); (2) the mode of development (in-house vs. outsourced); and (2) the phase of the project (e.g. idea generation vs. actual development). For example, R&D involvement tends to be higher for products developed in house and during actual development, while Customer Care's contribution is higher for new products and during the later stages of the development. These differences were justified in terms of differences in the amount of effort required from the different functions during the different types / stages of product. While such a selective functional involvement in the CFT allows an efficient distribution of scarce resources during NPD, it also runs the risk that different phases of the process and different products will be dominated by different functional perspectives, hampering communication and exacerbating the problems of poor intra-functional communication. This would have negative consequences for product quality and development time.

Open and frequent communication

With the few exceptions discussed above, communication within the product teams was very frequent, mostly informal and ad-hoc and largely relied on face-to-face interaction. While intensive and face-to-face communication facilitated mutual understanding improving productivity, ad-hoc and informal communication was reported as one of the strengths of the NPD process, increasing the speed of the process by facilitating fast coordination of NPD activities.

Physical co-location was the most important factor in explaining the large amount and high quality of intra-team communication. R&D operations are distributed across several sites in the home country and outside. However, in general (but not always) different sites tend to be involved in different activities which means that product team members tend to be co-located. This co-location facilitated frequent and ad hoc information sharing between product team members. For example, the communication between R&D and Product Marketing, which are located on the same site but in different buildings, was less

frequent and relied more on e-mails and phone calls rather than on face-to-face interaction due to the physical (and social) distance between them and the rest of the team. This distance was used to explain the difficult relationship that R&D had with the Product Marketing. Instances of poor communication created delays especially for the development of new products with a higher degree of complexity which requiring more intensive cross-functional interaction.

(Lack of) Organisational slack

Resource limitations - both in terms of limited human resources and significant time pressures – were identified as one of the major constraints during the NPD process. Limited resources constrain the selection process of the product concept, for example in terms of killing viable projects and justifying selective cross-functional participation during product development which diminish the performance of the NPD process (see discussion above). Most importantly, limited resources restrict the potential for product innovation in NPD, as the work becomes focused on short-term development rather than longer-term research. Lack of resources was often mentioned as the main reason why the HEA business unit is limited in its ability to develop radical new products. For example lack of resources constrains the ability of the unit to create a large dedicated technology scouting team. As a result, the HEA unit focuses mainly on developing products based on existing technologies and concepts. Lack of adequate support for long term development negatively affects product innovativeness.

HEA has a large number of relatively small NPD projects (between 50-70) running at the same time. People are generally assigned to a range of different projects with very short deadlines, and have to perform a range of different task. Lack of organisational slack also adds significant pressures to people who are forced to react fast and do not have enough time to concentrate on a single product. This means there is little space for thinking about improvements in existing products, and even less for thinking about ideas for new ones; the focus tends to be on the getting products under development out fast to fit the fast changing demands.

Top management commitment - resource allocation criteria

In HEA, there are three criteria that senior management uses to guide resource allocation during the new product selection process: (1) product portfolio fit; (2) a sound business case; and (3) R&D resource implications. The decision happens during the idea generation stage, before actual development starts.

The portfolio fit is assessed based on a road map including the products that are to be developed in the next interval. Portfolio fit assessment takes place at two levels. First, at the level of the business group, new ideas for HEA products need to fit with the other type of products under development within the parent organisation. At this level the assessment is based on the parent's product annual road map and involves clear timetable and market analyses. Second, at the unit level the product ideas for new products needs to fit the target users. At this level, the assessment is based on the six months road map (as HEA's products have on average a six months life cycle) and involves product usability, product design, competitor analysis, market data, pricing structure, and sales results. The business case assesses both the strategic considerations (in terms of identifying the drivers for the product), and the financial case behind the product (in terms of providing

clear sales and revenue forecasts, and analyses concerning the long term profitability of the product).

The arguments based on portfolio fit and business case are made by the representative of the Product Management who generally develops the product idea propositions. These ideas are balanced against their cost in terms of R&D resource implications. It is this balancing act that dictates how resources are allocated and which product ideas are pursued. This decision is constrained by significant resource limitations, which have forced the senior management to introduce a prioritisation system to allocate scarce resources between potential products. This system means that potentially viable products with lower priority are regularly killed because of lack of resources.

Attitude to risk

The attitude to risk, in particular wide tolerance of failure, was identified as one of the critical areas of the NPD process. Short product development life-cycles mean that decisions-making is fast, short term focused and more flexible that in other units within the parent organisation. Fast decision-making mitigates the risks of operating in a dynamic market – it is better to take a wrong decision fast and then correct it along the way, than to delay the decision in the first place. This tolerance of decision making failure is facilitated by the nature of product development in HEA. Because the level of investment per product is relatively small and a large number of products are under development at any single time, more risk can be taken with the product. Tolerance to failure and a positive attitude to risk were discussed as significant enablers of shorter development cycles.

5. Findings

The HEA case study identifies a number of challenges that the unit faced in trying to implement practices to support creativity (see Table 3).

Table 3 Challenges in the implementation of best practices in to support creativity in NPD

Practice	*Challenge*
Cross functional teams	Resource limitations and a focus on accelerating the speed of the NPD process means that involvement of the different functions in the team tends to be sequential. This limits the ability of the CFT to reduce development time and improve product quality.
Frequent communication	Aided by the unit small size and by the physical co-location of the NPD teams.
	The clear delineation of products according to sites, while aiding communication, was seen as detrimental to long term cross-fertilisation between the different sites and stifled idea generation
Organisational slack	Management attitude to resource constraints as an exogenous factor means that little is done to build in organisational slack

Long term top management commitment to major projects	The dynamic market leads to short term focus, which hampers commitment to creativity (requires long term vision).
Attitude to risk taking	Smaller projects limit the exposure to financial loss and encourage higher tolerance of failure.

Functional diversity improves decision-making aiding both product quality and the overall delivery time. The major danger here is that, due to efforts to manage resources effectively, the active involvement of the different functions becomes sequential and a single function takes the lead during the development of a particular product or during particular phases of the process. This obstructs the informational benefits resulting from functional diversity. While limited resources constraint the ability of the unit to ensure wide cross functional involvement throughout the development cycle, one option would be to focus on the most critical functions at each particular stage. Current research suggests that integration between Marketing and R&D is essential during pre-development stages, while during the actual development the relationship between Manufacturing – R&D becomes critical (Frishammar and Ylinenpaa, 2007).

The organisation of product development in HEA is characterised by frequent and open communication and functional diversity in product development. Effective communication between product team members facilitates effective cross-functional work throughout the entire NPD process. In line with current literature (Swink, 1998), the physical co-locations of most of the product team members (facilitated by the small size of the unit and the clear separation of product areas between the different sites) was found to be one of the critical factors that facilitated effective intra-team communication, leading to fewer delays in development and better product quality. However, one potential danger here emerges from the clear separation of activities between the different sites. Separation of activities between sites enables effective intra-team communication in the short term, but limits the ability of the unit to incorporate different perspectives across different locations in their product teams. A multi-perspective approach to product development is essential in enabling a dynamic and flexible approach to NPD that sustains the development of innovative products in the future.

Severe resource constraints, in the form of lack of organisational slack, limit the ability of HEA to take full advantage of the creative potential of the CFT approach. Lack of organisational slack explains the limited cross functional involvement during the idea generation stage, as well as the lack of resources to develop a technology scouting team to focus on long term technology development. Hence limited resources lead to ineffective use of CFT, introduce delays in the process and constraint the ability of the unit to develop innovative new products. Too often, time and resources are seen as a constraint or as a measure of outcomes, rather than as a variable that managers can influence to both trigger and facilitate innovation and change. This was also the attitude in HEA R&D where managers regarded the resource constraints as an exogenous factor. There are however different ways in which organisational slack could to be developed. For example, a dedicated team could be created that would work independently from the product development teams on product idea generation. This would require that not all resources are allocated to the existing product development teams. A less resource intensive approach would be to use product platforms for development where product components would be shared across a number of products. A product platform approach would enable re-use of resources and would free existing resources as common elements

could be reused across products. By providing some, but limited, time and resources, managers can minimize the rigidity that comes from work overload, and the laxness that comes from too much slack (Vissers and Dankbaar, 2002).

Top management commitment to innovation was mentioned by respondents as one of the major strengths of the NPD process. However, such commitment tends to be short-term focused, emphasising fast development rather than long-term investment in major projects. While such a short-term focus is justified by a dynamic market, which requires constant re-evaluation of product development to fit changing market demands, it also produces a myopic approach to NPD, where all efforts are concentrated on keeping up the pace with existing market demands, rather than investing in longer term technology and product development plans. It is this longer-term view that enables the development of innovative new products to sustain future growth. To address this gap, the assessment of new product concepts and resource allocation should include longer-terms objectives such as market growth, or building an interdependent portfolio of products.

Encouraging reasonable risk taking is one of the most cost effective ways of encouraging a creative climate to stimulate creativity. Overall, the NPD process in HEA seems to be characterised by a high tolerance of failure. Such high tolerance of failure was aided by the relatively smaller size of the HEA projects both in terms of time and resources. Such an approach encourages staff to commit to and become involved in innovative projects.

6. Conclusions

The paper has identified a number of challenges associated with the implementation of what is deemed “best practices” in stimulating creativity in NPD in order to speed up development and improve product innovativeness. While most of the literature focuses on identifying relevant best practices in NPD, this study explores the difficulties that firms have in implementing these practices. Some of these challenges translate into trade-offs that firms encounter, for example in co-locating team members to facilitate communication versus spreading them across different sites to encourage knowledge interchange. Other trade-offs involve management commitment to short term incremental projects versus long term technology development, and wide involvement of functional disciplines in NPD to build effective CFT versus limited involvement to enable effective use of limited resources. The existence of such trade-offs suggests that the adoption of NPD best practices needs to be seen as contingent on the context of implementation (e.g. extent of organisational slack, environmental pressures for short development times) as well as on the overall objectives of the organisation (focus on incremental versus radical innovation).

The major limitation of the paper is the single case study approach, which although enables an in depth exploration of the approach to NPD, also limits the ability to generalise the findings concerning the presence or absence of such challenges across a wide range of organisations. To enable such an objective, future research needs to adopt a more quantitative approach to research, either in the form of a large scale survey or a multi-case study research design exploring the implementations of practices to support creativity and innovation in NPD.

Nevertheless, the major contribution that this paper makes to current NPD literature is to provide a starting point for an exploration of the challenges – and ways of overcoming

them – associated with the adoption of practices to stimulate creativity in NPD. In the NPD literature much is made of the ways of improving communication and CFT to support idea generation, and such practices have been adopted widely in the industry. However, their implementation is often problematic. Challenges need to be first identified and then solutions need to be found to address them. Only once these challenges and their associated solutions are found will organisations to be able to encourage creativity and innovation effectively throughout their NPD process. This paper represents a small step towards achieving this objective.

References and Notes

Afonso, P., Nunes, M., Paisana, A. and Braga A. (2008). The influence of time-to-market and target costing in the new product development success, *International Journal of Production Economics*, 115(2), 559-568

Alves, J., Marques, M.J.; Saur, I. and Marques, P. (2007). Creativity and Innovation through Multidisciplinary and Multisectoral Cooperation, *Creativity and Innovation Management*, 16(1), 27-34.

Bayus, B.L. (1997). Speed-to-Market and New Product Performance Trade-offs, *Journal of Product Innovation Management*, 14(6), 485-497.

Bessant, J. and D. Francis (1997). Implementing the new product development process. *Technovation*, 17(4), 189-197.

Bessant, J. and Tidd, J. (2007) *Innovation and Entrepreneurship*, Chichester: John Wiley & Sons.

Brown, S. L. and Eisenhardt, K. M. (1995) Product Development: Past Research, Present Findings, and Future Directions, *The Academy of Management Review*, 20(2), 343-378

Buganza, T., Dell'Era, C. and Verganti, R. (2009). Exploring the Relationship Between Product Development and Environmental Turbulence: The Case of Mobile TLC Services, *Journal of Product Innovation Management*, 26(3), 308-321.

Cooper, R.G. and Kleinschmidt, E.J. (1996). Winning Businesses in Product Development: The Critical Success Factors, *Research & Technology Management*, 39(4), 18-29.

Cormican, K. and O'sullivan, D. (2004). Auditing best practice for effective product innovation management, *Technovation*, 24(10), 819-829.

Dougherty, D. (1992) Interpretive barriers to successful product innovation in large firms, *Organization Science*, 3(2), 179-202

Dooley, K.J. and Johnson, D. (2001) Changing the New Product Development Process: Reengineering or Continuous Quality Improvement? *Measuring Business Excellence*, 5(4), 32-38

Dooley, K.J., Subra, A. and Anderson, J. (2002). Adoption Rates and Patterns of Best Practices in New Product Development, *International Journal of Innovation Management*, 6(1), 85-103

Ernst, H. (2002) Success factors of new product development: a review of the empirical literature, *International Journal of Management Reviews*, 4(1), 1-40

Frishammar, J. and Ylinenpaa, H. (2007) Managing information in new product development: a conceptual review, research propositions and tentative model, *International Journal of Innovation Management*, 11(4), 441-467

Griffin, A. (2002). Product development cycle time for business-to-business products, *Industrial Marketing Management*, 31(4), 291-304

Griffin, A. (1997). The Effect of Project and Process Characteristics on Product Development Cycle Time, *Journal of Marketing Research*, 34(1), 24-35.

Gupta, A.K. and Wilemon, D.L. (1990) Accelerating the Development of Technology-Based New Products, *California Management Review*, 32(2), 24-44.

Imai, K., Nonaka, I. and Takeuchi, H. (1985) Managing the new product development process: how Japanese companies learn and unlearn, in Hayes, R.H. et al (eds.) *The Uneasy alliance: Managing the productivity-technology dilemma*, Boston: Harvard Business School Press, 337-375.

Ittner, C.D. and Larker, D.F. (1997). Product Development Cycle time and Organizational Performance, *Journal of Marketing Research*, 34(1), 13-23

Jackson, S.E., May, K.E. and Whitney, K. (1995) Understanding the dynamics of diversity in decision-making teams, In Guzzo, R.A. et al. (eds.) *Team Effectiveness and Decision Making in Organizations*, San Francisco: Jossey-Bass, , pg. 204-261.

Keller, R.T. (2001) Cross-functional project groups in research and new product development: diversity, communications, job stress, and outcomes, *Academy of Management Journal*, 44(3), 547-555.

Lynn, G.S., Abel, K.D., Valentine, W.S. and Wright, R.C. (1999) Key Factors in Increasing Speed to Market and Improving New Product Success Rates, *Industrial Marketing Management*, 28(4), 319-326

Mabert, V.A., Muth, J.F. and Schmenner, R.W. (1992). Collapsing New Product Development Times: Six Case Studies, *Journal of Product Innovation Management*, 9(3), 200-212

McDonough, E.F. (2000) Investigation of Factors Contributing to the Success of Cross-Functional Teams, *Journal of Product Innovation Management*, 17(3), 221-235.

Menon, A., Chowdhury, J. and Lukas, B.A. (2002). Antecedents and outcomes of new product development speed. An interdisciplinary conceptual framework, *Industrial Marketing Management*, 31(4), 317-328.

Miles M.B., Huberman A.M. (1984). *Qualitative Data Analysis: A Sourcebook of New Methods*. Newbury Park, CA: Sage.

Payne, R. (1990) The effectiveness of research teams: a review. On West, M.A. and Farr, J.L. (eds.), *Innovation and Creativity at Work*, Chichester: Wiley, 101-122.

Rosenthal, S.R. and M.V. Tatikonda (1992). Time Management in New Product Development: Case Study Findings. *Journal of Manufacturing Systems*, 11(5), 359-368.

Sethi, R., Smith, D.C. and Whan, P.C. (2001) Cross-Functional Product Development Teams, Creativity, and the Innovativeness of New Consumer Products, *Journal of Marketing Research*, 38(1), 73-85

Song, X.M., Montoya-Weiss, M.N. and Schmidt, J.B. (1997). Antecedents and Consequences of Cross-Functional Cooperation: A Comparison of R&D, Manufacturing, and Marketing Perspectives, *Journal of Product Innovation Management*, 14(1), 35-47.

Stalk, G.T. (1988). Time – The Next Source of Competitive Advantage, *Harvard Business Review*, (July – August), 41-51

Starr, M.K. (1992). Accelerating innovation, *Business Horizons*, 35(4), 44-51.

Stalk, G.T. and Hout, T.M. (1990) *Competing Against Time*, New York: The Free Press.

Swink, M.L. (1998) A tutorial on implementing concurrent engineering in new product development programs, *Journal of Operations Management*, 16(1), 103-116.

Tatikonda, MV. and Montoya-Weiss, M.M. (2001). Integrating Operations and Marketing Perspectives of Product Innovation: The Influence of Organizational Process Factors and Capabilities on Development Performance, *Management Science*, 47(1), 151-172

Tidd, J., Bessant, J. and Pavitt, K. (2005) *Managing Innovation*, 3rd edition, Chichester: John Wiley & Sons.

Vissers, G. and Dankbaar, B. (2002). Creativity in Multidisciplinary New Product Development Teams, *Creativity and Innovation Management*, 11(1), 31-42