

**Using time and (social) space when trying to innovate.  
Acknowledging the nature of knowledge creation processes.**

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**Abstract**

Research into the management of technology and innovation has highlighted the many pitfalls and problems that are usually encountered during the innovation journey. At different levels of attention and analysis, early work in the field (e.g., Allen, 1963, 1966, 1969, 1977; Myers and Marquis, 1965; Pelz and Andrews, 1967) has pointed to the importance of joint or collaborative problem-framing and problem-solving activities to accomplish the innovation task at hand. In essence, this rich and diverse stream of research has pointed to the central role of *handling* - and from a performance point of view, reducing - *uncertainty* during the various phases of the innovation process. Information and information exchange were considered and shown to be critical elements in this endeavor.

A closer look at this research program reveals that at various stages the innovation process benefits enormously from boundary-spanning information exchanges and insights. Not only does this boundary-spanning activity play an important role during the implementation and problem-solving phases of the innovation process, but the problem framing or gestation phases of the innovation process may benefit from these boundary-spanning interactions as well. Following the French saying that “*du choc des idées jaillit l'esprit*” - the concept of boundary-

spanning has received widespread attention and support as one of the key phenomena that occur or should occur during any innovation effort.

Introducing the concept of boundary-spanning, though, immediately reveals the complex nature of collaboration during NPD processes. At the level of the innovation project, boundary-spanning is important and problematic at the same time, because it points to the necessity of confronting and integrating different “functions” (e.g., marketing, R&D, engineering) or “disciplines” (e.g., mechanical engineering, electrical engineering, chemical engineering) within and across organizations during the development of new technological knowledge and/or artifacts. Hence, in order to arrive at novel solutions or artifacts, collaboration during new product development processes requires addressing these differences in opinion and translating them into an innovative synthesis. As such collaboration is not only instrumental for reducing uncertainty; *handling ambiguity* becomes a prerequisite as well. Whereas uncertainty can be defined as “characteristic of a situation in which the problem solver considers the structure of the problem (including the set of relevant variable) as given but is dissatisfied with his or her knowledge of the values of these variables” (Schrader, Riggs and Smith, 1993), ambiguity implies an unclear situation with respect to the problem-definition and hence problem solving space considered as relevant by the actors involved. Similarities can be noticed with the notions of problem-definition and problem-solving as described by Allen (1977), the concepts of exploitation and exploration as advanced by March (1991), or even the seminal distinction made by Argyris between single and double loop learning (Argyris, 1982, 1992).

### Organising the NPD process

In recent years, a host of scholars has advanced new ways to organise the product development process. Central concerns in this endeavour relate to speeding up the development process or, stated otherwise, to work with extended ‘windows of opportunity’ during new product development efforts. Important contributions in this respect are to be found, amongst others, in the writings of Iansiti (1995, 1997, 1998), MacCormack and Iansiti (1998), Verganti, MacCormack and Iansiti (1998), Brown and Eisenhardt (1997) and Eisenhardt and Tabrizi (1995). Major ingredients of the models developed in these writings include “learn-adapt cycles” or “iterative”

approaches (Verganti, MacCormack & Iansiti, MacCormack 1998) and ‘experiential’ ways of working (Eisenhardt & Tabrizi). These imply high levels of customer involvement, frequent cycles of concept (re)design and development consisting of multiple iterations and extensive testing. The relevance of these models increases as the levels of uncertainty being faced increase. The traditional, rational planning or stage-gate models are no longer sufficient in turbulent, fast-evolving environments. In other words, the planning approaches that have long been predominant both in theory and practice on managing new product development, have been complemented by more adaptive, experiential approaches toward new product development efforts.

The central assumption behind these adaptive models is best described as a reliance on a “philosophy of fast learning” (Iansiti) or “fast organisational processes”. However, there still is little “understanding in the organisational literature of how and why processes are fast” (Eisenhardt and Tabrizi, 1995, p. 107).

#### The social side of knowledge creation

*“An outrée explanation, violating all our preconceptions, would never pass a true account of novelty. We should scratch round industriously till we found something less eccentric. The most violent revolutions in an individual’s belief leave most of his old order standing. Time and space, cause and effect, nature and history, one’s own biography remain untouched. New truth is always a go-between, a smoother-over of transitions. It marries old opinion to new fact so as ever to show a minimum of jolt, a maximum of continuity. We hold a theory true just in proportion to its success in solving this problem of maxima and minima. But success in solving this problem is eminently a matter of approximation. We say this theory solves it on the whole more satisfactorily than that theory; but that means more satisfactorily to ourselves, and individuals will emphasise their points of satisfaction differently. To a certain degree, therefore, everything here is plastic. The point I now urge you to observe particularly is the part played by the older truths. Their influence is absolutely controlling. Loyalty to them is the first principle - in most cases it is the only principle; for by far the most usual way of handling phenomena so novel that they would make for a serious rearrangement of our preconceptions is to ignore them altogether, or to abuse those who bear witness for them.” (W. James, 1907, p.25).*

By examining several case studies conducted over the last three years (n=8) and relating them to insights stemming from the fields of innovation management and knowledge creation processes, we want to add to our understanding of the underlying dynamics and activities that constitute “fast” new product development processes. The findings presented and discussed in this paper will lead to the suggestion that “fast learning” is only one side of the NPD medal. A more encompassing interaction repertoire is needed to handle the complexity implied in NPD processes. This becomes clear when bringing ambiguity into the “management equation”. As adaptive models are in essence geared towards reducing the levels of uncertainty in a particular new product development endeavour, handling ambiguity and dealing with – potentially creative – conflicts are topics hardly touched upon. The current emphasis on speed and time compression seems to presuppose the presence of shared opinions about what constitutes a relevant problem solving space. Stated otherwise, conflicts and the handling thereof in an integrative manner seem to disappear from the NPD scene. While this, at first glance, might sound as a welcome observation – as the processes related to conflict handling and resolution are indeed complex, time-consuming and in several cases, even painful – there is a price to be paid. And the price tag in this case is labelled novelty. As pointed out by scholars like Schön (1963) and Murray (1972) *novel* solutions and insights stem from problem defining and solving *interaction* sequences, whereby multiple opinions and viewpoints become integrated into a new synthesis or artefact. Underlying this ‘displacement’ of concepts, social processes can be found as illustrated extensively by Murray when examining the work of Pasteur or the emergence of new medical disciplines. Ben-David and Collins (1966) point out similar dynamics when documenting the genesis of psychology as a scientific discipline. More recently, traces of these ‘social’ origins of novelty<sup>1</sup> can be found in the work of Pinch and Bijker when scrutinising the development trajectory of the bicycle (Pinch & Bijker, 1995).

Still, these social origins of novelty tend to become neglected when advancing managerial best practices in an area where creating novelty should be high on the agenda, i.e. new product development processes. One of the reasons for this

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<sup>1</sup> On a more basic level, scholars like Vygotsky (1978) and Luria (1972) even illustrated the social nature of the development process of (higher) mental functions.

inattention might just be found in the fact that such integrative processes bring along their own, often slower - and always more complicated - social digestion and realisation rhythm. Conflict plays in this respect a pivotal role (Doise & Mugny, (1984). Handling conflicts in a constructive, integrative manner adds to the collaborative requirements imposed on the NPD team. One of the major challenges in this respect concerns combining the radical function implied in the formation of new concepts, with its conservative counterpart, i.e. retaining patterns of old concepts (Schön, 1963; James, 1907).

Such path dependent phenomena (for a recent overview see Garud & Karnoe (2000), automatically put conflicts and the constructive, integrative handling of them, high on the agenda. Moreover – as mentioned above – NPD teams should not only be addressing this ‘requisite’ ambiguity; they have to deal continuously with handling, i.e. eliminating, the uncertainties encountered during the innovation endeavour. When scrutinising the requirements in terms of interaction or collaboration related to handling uncertainty on the one hand and ambiguity on the other hand, trade-offs become visible, whereby sacrificing novelty in favour of speed is clearly the most apparent. These trade-offs will be discussed in detail and their implications for innovation strategies and the translation thereof within adequate organisational arrangements will be explored. Adopting on a large scale adaptive, ‘fast organising’ principles might be one way to deal with the paradoxical requirements sketched, but clearly at the expense of novelty. Other, more balanced approaches will be advocated which often require moving beyond the level of the individual project. Using time and the - social - space available; by means of portfolio arrangements, roadmaps, and even diversified organisational arrangements including spinout configurations are advanced as ways to realise innovation strategies that do combine both novelty and time-to-market requirements.

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