Disruptive Innovation Explored

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9th IPSE International Conference on Concurrent Engineering: Research and Applications (CE2002), July 2002

Reference:
Thomond, P., Lettice, F., 2002. "Disruptive Innovation Explored",
Concurrent Engineering Conference Proceedings July 2002

ABSTRACT: Disruptive innovation is a term used to describe innovation that is of highly discontinuous or revolutionary nature, which is the opposite of evolutionary or incremental innovation. The term is becoming more widely recognised, but a consistent view of what disruptive innovation is or how it is defined is missing. This paper explores the different dimensions of disruptive innovation put forward by different authors and proposes a working definition as a key building block for an European Commission (EC) co-sponsored research project ("DisruptIT"). The working definition will be used to guide the development of the tools and methods that will help organisations enable and manage disruptive innovation as a key competitive strategy.

1 INTRODUCTION

In a competitive environment that is global, intense and dynamic the development of new commercially exploitable products, services and business models is a focal point of competition (Christensen, 1997; Hamel, 2000; Hill and Jones 1998; Johnson and Scholes, 1997, Wheelwright and Clark 1992). "In many ways innovation is the single most important building block of competitive advantage… giving a company something unique that its competitors lack" (Hill and Jones 1998:166).

Innovations can be thought of as falling onto a continuum from evolutionary to revolutionary (Christensen, 1997; Hill and Jones 1998; Tidd et al, 1997; Trott, 1998; Veryzer, 1998) and therefore categorised into two groups: (1) Incremental or evolutionary innovations that improve the performance of established products, services or business models "along the dimensions of performance that mainstream customers in major markets have historically valued" (Christensen, 1997:xv. They are critical to sustaining and enhancing shares of mainstream markets (Baden-Fuller and Pitt, 1996; Hill and Jones 1998; Johnson and Scholes, 1997). (2) Revolutionary breakthroughs lie at the core of entrepreneurial activity and wealth creation (Schumpeter 1975) and almost by definition serve as the basis of future technologies, products, services and industries (Tushman and Anderson 1986). Terms such as "disruptive", "radical", "non-linear", "discontinuous", "breakthrough", "paradigm-shifting" and "revolutionary" have all been used to describe what is in essence the opposite of sustaining innovations.

That firms need to periodically engage in the process of revolutionary or disruptive innovation for long-term survival is well-recognised (Betz 1993; Christensen, 1997; Christensen and Rosenbloom, 1995; Hamel, 2000; Tushman and Anderson 1986; Tushman and Nadler 1986). An article in "businesswire.com" (2000) illustrated that one-third of the companies listed in the 1970 Fortune 500 had vanished by 1983 and attributed almost all of this demise to companies not anticipating and embracing disruptive innovation. Although many companies achieve successful innovation, few organisations understand or have established track records for undertaking successful disruptive innovation (Christensen, 1997), in fact many are reluctant to follow this path (Christensen, 1997; Hamel, 2000; Tushman and Anderson).

This paper will present some of the key concepts behind "disruptive" innovation and identify some of the difficulties that organisations face in seeking to pursue it. It will draw from these findings to deliver a working definition and characteristics list of disruptive innovation for use by the "DisruptIT" Project.

2 DIMENSIONS OF DISRUPTIVE INNOVATION – BEYOND RADICALISM

Before discussing the dimensions of disruptive innovation it is useful to consider some examples such as the light-bulb industry's disruption of the candle industry and the desktop computer industry's disruption of the mainframe computer industry. An ex-

ample of disruptive innovation currently in progress is the DVD industry disrupting the VHS industry. A potential disruptive innovation might be "flash card memory" (as the technology improves it has the potential to disrupt the disk drive industry).

These new paradigms represent discontinuous innovations or, discontinuities in trajectories of progress as defined within earlier paradigms - where a technological paradigm is a pattern of solutions for selected technological problems (Dosi, 1982).

In fact, new paradigms redefine the future meaning of progress and a new class of problems becomes the target of normal incremental innovation (Dosi, 1982). Thus for a discontinuous innovation to be disruptive, successful exploitation is vital, which, results in significant transformation of the mainstream market and its value proposition.

The term 'value network' - "the context within which a firm identifies and responds to customers' needs, solves problems, procures input, reacts to competitors and strives for profit" (Christensen, 1997:31). - builds upon the understanding of the effect that new technological paradigms can have on mainstream paradigms, Figure 1 illustrates how established firms decisions' to ignore technologies that do not appear to address their customers' needs become fatal when two paradigmatic trajectories of progress interact. The term "disruptive innovation" is introduced to explain the impact of this interaction.

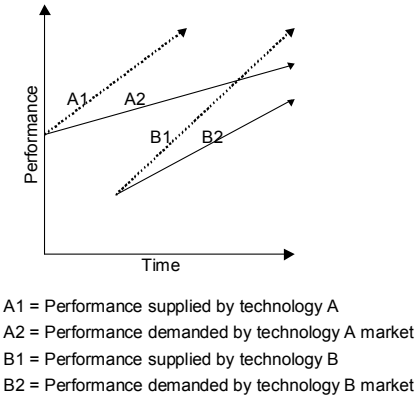

Figure 1. Intersecting trajectories of: Performance Demanded vs. Performance Supplied (Christensen 1997)

As the performance demanded by the customers of a value network increases over time so does the performance provided within a technological paradigm. Quite often the performance improvement provided has a different trajectory to the trajectory of performance improvement demanded by customers in the value network. When the trajectory slopes differ and performance provided exceeds performance demanded new technologies that were only performance-competitive in remote value networks may migrate into other networks. This provides innovators with a vehicle to new customers, who would have previously viewed the innovation as substandard; and enables them to offer established mainstream markets a new set of performance value attributes that are now more relevant than the current paradigm.

Fundamental technological change affects the rise and fall of populations within organisational communities (Astley, 1985). Christensen's theory (as set out above), further highlights how the evolution of the value networks surrounding emerging or niche markets, that have not been satisfied by existing paradigms, can significantly disrupt and threaten key players in mainstream networks.

Examining the extent of disruption that major breakthroughs cause, Tushman and Anderson (1986) conclude that discontinuous innovations can be broken down into subgroups: "product discontinuities" and "process discontinuities". Furthermore, they find that these discontinuities are either 'competence-destroying' or 'competence-enhancing'. Competence-destroying discontinuities, requiring new skills, abilities and knowledge, are initiated by new entrants – or spin-off companies (Christensen, 1997; Hamel, 2000) – and are associated with increased environmental turbulence and increased market uncertainty, usually delivering a new product class, a significant product substitute or a radical new way of making a product. Alternatively, competence-enhancing discontinuities "represent an order-of-magnitude improvement over prior products, yet build on existing know-how" (ibid:442), they are initiated by existing firms and are associated with little or even decreased environmental turbulence and reduced market uncertainty.

Therefore, Tushman and Anderson (1986) introduce the notion that discontinuous change occurs in both products and processes and that discontinuous innovations fall onto a continuum from radical change that is not necessarily disruptive to major disruptive paradigm transformations for entire value networks.

Veryzer (1998) makes the distinction between "product capability" - the benefits of products as perceived by customers and users, and "technological capability" - the degree to which the product involves expanding capabilities beyond existing organisational boundaries. He showed that organisations could deliver three types of discontinuity, as illustrated in Figure 2. Once again the perceived value attributes of a product or service are important to discontinuities with potential for disruptive innovation and each type requires a different management approach.

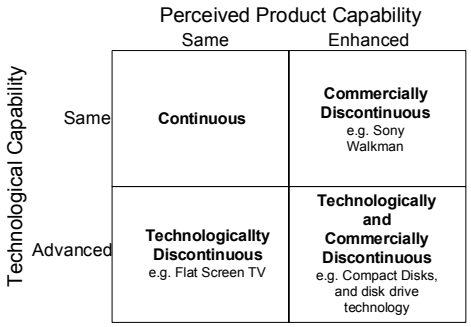

Figure 2. Types of Discontinuous Innovation (Veryzer, 1998)

It has been shown that radical innovation involves the application of significant new technologies, or significant new combinations of technologies, to new market opportunities (Tushman and Nadler, 1986), giving rise to new products, services or business models which can be developed into potentially disruptive value networks. Ahuja and Lampert (2001) concur with this and have extended the approach stating that technological breakthroughs leading to potentially disruptive innovations can be developed though exploring: 'novel technologies', 'emerging technologies', and, 'pioneering technologies'.

Hamel (2000) suggests that the system level is where the real benefits of 'non-linear' or disruptive innovation can be found. He states that organisations can disruptively innovate with products or services but the real value is only unlocked when the larger system is factored into the disruption. By unpacking the business model and exposing it to disruptive thinking, Hamel states that "Business Concept Innovation" occurs and that this is the real essence of revolutionary innovation, causing disruption to preconceived ideas, markets and entire value networks.

In summary, revolutionary innovations fall onto a continuum ranging from *'radical incrementalism'* – that delivers significant change to the mainstream market which is mostly competence enhancing with low environmental turbulence and low market uncertainty - to totally *'disruptive innovations'* – that deliver transformational change to the mainstream market and its value attributes which, are mostly competence destroying with high environmental turbulence and high market uncertainty (see Figure 3)

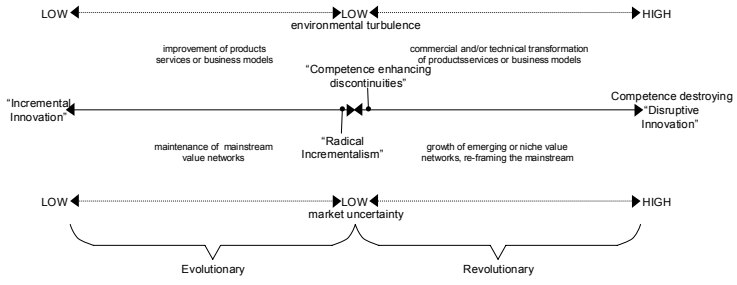

Figure 3. The Innovation Continuum (developed from the literature in the report)

3 ATTEMPTING DISRUPTIVE INNOVATION – THE PROBLEMS ORGANISATIONS FACE

Ahuja and Lampert (2001) show that the desire to maintain a stable and efficient context to satisfy mainstream market demands, forces many organisations into a focus on the 'familiar', the 'mature' and the 'proximate'. Thus most organisations fall into learning traps preventing them from 'exploring' potentially disruptive ideas at all. In addition, the problem types created by normal business routine actually hinder truly creative thinking (Unsworth, 2001).

It would appear that the fundamental nature of disruptive innovation necessitates organisations to lead and not follow and that organisations long-term competitive strength lies in the capacity to be corporately entrepreneurial (Baden-Fuller and Pitt, 1996). Tidd (1997) states that most companies struggle to deliver transformational change at any level of the organisation, instead choosing to focus on incremental and occasionally mildly radical innovation. Furthermore, Trott (2001) demonstrates that standard market research can provide little or no benefit for exploring the potential of disruptive ideas, in fact he found that market research can even obstruct radical idea development.

If an organisation manages to foster a potentially disruptive idea, not only does it often face problems getting internal support (Rice et al, 2001) but there are problems to overcome to get it adopted by the mass market. Moore (1995) addresses the huge difficulties faced by companies trying to 'cross the chasm' from early market acceptance to gain the support of the 'early majority' and how to deal with the problems that occur when the early majority begins to rapidly adopt the new technology or change (see Figure 4)

Disruptive innovation only begins to be truly realised when the marketplace shifts to adopt a new paradigm in what he calls the "tornado" of adoption. Once the tornado begins it is not long before the majority of potential customers in the marketplace have undergone dramatic change in their past behaviour with the promise of gaining equally dramatic benefits from the new paradigm.

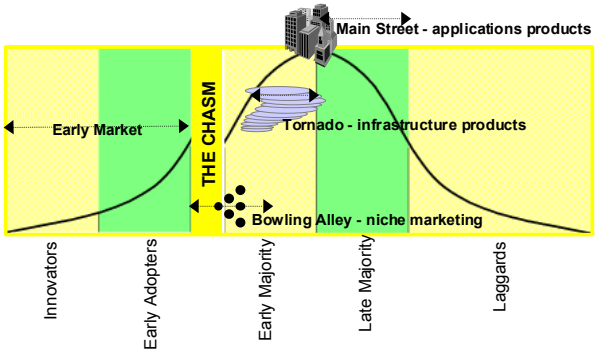

Figure 4. Inside the Tornado of the "Technology Adoption Lifecycle (Moore, 1995)

4 DISRUPTIVE INNOVATION – A WORKING DEFINITION AND CHARACTERISTICS LIST

Based on the literature the following working definition and characteristics list has been formulated for the "DisruptIT" project:

A disruptive innovation is a successfully exploited product, service or business model that significantly transforms the demands and needs of a mainstream market and disrupts its former key players. It has the following characteristics:

- It begins its success by meeting the unfulfilled needs of an emerging or niche market.
- Its set of performance attributes, highly rated by niche market customers, are not initially appreciated by mainstream markets. Mainstream market customers as well as competitors value different performance attribute sets and therefore view the innovation as substandard.
- Niche market adoption enables investment in the product, service or business model to increase its performance. It can then create or enter new niche markets and expand customer numbers.
- Awareness of the product, service or business model increases, forcing and influencing change in the mainstream markets perception of what it values
- The change in the mainstream market's perception of what it values is the catalyst that enables the innovation to disrupt and replace existing mainstream products, services or business models.

Currently, the multifaceted and interrelated issues of disruptive innovations have not been investigated in depth. The phenomenon with examples has been described by many authors, but a deep understanding of the entire subject is missing along with tools enabling businesses to create and exploit the opportunities of "Disruptive Innovation". To fill this gap in knowledge the EC co-sponsored project, "DisruptIT", aims: "*to develop a state of the art methodology, supported by an advanced IT tool suite that will help European enterprises continually enable and manage 'Disruptive Innovation' as a major competitive strategy"*.

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Acknowledgements:

Thank you to Scott Hawkins and Matthias Stabe for their contributions to the definition.