Innovation through internet : Managing in Discontinuity¹

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Abstract

Internet and the possibilities offered by new telecommunication technologies enable the firm to drastically change the value created for the customer and the business processes that deliver that value. In other words companies have the possibility to use the discontinuity in technologies to drastically innovate

Based on a set of in depth case studies of how incumbents react to the challenge of internet start ups we want to address whether innovation on internet requires a different management approach, or is it a more or less straightforward application of innovation management lessons that we have learned from other occasions where technological discontinuity offered the possibility to revolutionize an industrial sector ? We conclude that some lessons from the past apply, but that at the same time internet companies need to develop additional capabilities to innovate.

1. Introduction

One of the authorsⁱ carried out in 1997 a survey of a set of large multinationals from the FORTUNE 500 list, and this in order to understand how these companies use internet. The research indicates that about 2/3rds of the surveyed firms are simply treating the Internet as a publishing medium and most of the rest 1/3rd appear content with simply transporting their existing business models onto the Internet. Very few firms are actively using the Internet for launching new business models. Even the highest ranked firms in the study achieve an overall score of only 68% and there are just eight firms with overall scores higher than 50%. While it would be wrong to evaluate the Internet strategies of the surveyed firms solely on the basis of these scores, these low figures indicate that there is a lot of room for further exploiting the Internet within large, global firms who constitute the sample of the research. The results of this study are interesting because they demonstrate that much more can be done by most organizations for exploiting the Internet. While the media reports of increasing volumes of on-line commerce are encouraging, the study shows that most large corporations are doing little to exploit the unique transformational potential of the Internet. That exploitation will require more innovation.

¹ Please do not quote without consent of the atuthors.

On the basis of a series of clinical case studies on how incumbents or internet start ups have exploited the internet opportunities we have then examined whether the innovation process on the internet is different from traditional lessons about innovation management. Over the last few months the authors have carried out a number of case studies on internet start ups (e.g. Celebrity Sightings or MyWeb) and more in particular on incumbents who have attempted to fight off the challenge posed by new internet start ups, (e.g. Barnes and Noble versus Amazon, GM versus Autoby-Tel, Charles Schwab versus E-trade)². The key question we wanted to address is how these companies have managed the innovation and change process. Understanding how they took on the challenge of innovation is essential to understand how incumbents can be successful in this new environment.

The three case studies on incumbents have this in common : the competitive scene has been changed dramatically through the arrival of start up challengers, but in each of the cases the incumbents are countering the newcomers by adapting radically new business models. This is exciting but in order to be intellectually honest we should ask ourselves the question whether what we observe is different from what has happened before in business history. It is not the first time that we are confronted with major disruptions in technological trajectories. Is the introduction of Internet based technologies different from those other moments that we were confronted with major discontinuous innovations in business history? Is there really a difference between what we see happening today, with the E- trade, Auto-by-Tel or GM, book sales by Amazon or Barnes and Noble, and with what happened at the beginning of the 20th-century in the automotive industry, or at the moment of the introduction of transistors.

2. Innovation in discontinuity: what do we know from previous paradigm changes?

There exists a very comprehensive body of experience on how to manage innovation in periods of discontinuity. Summarising that is obviously beyond our objective. What our case studies illustrate, is a particular group of events and processes, which have to do with discontinuous service innovations, and which have been made possible by the emergence of a new and powerful infrastructure. The keywords here are *infrastructure, service and discontinuity*.

Internet and intranets innovations have perhaps little to do with discontinuous innovations such as the replacement of vacuum tubes with transistors, or horse carts with automobiles. But there may be some similarities with what happened when infrastructure based innovations such as the railway systems were developed. Other examples that bear some resemblance are the current hub and spoke system for air transport, or the situation when banks in Continental Europe engaged in exponential growth of bank branches all over their respective countries.

When you think for a moment about these examples you will realise that all of these started as an innovation in processes and infrastructure, entailing lots of product and service innovations afterwards. Steam powered machines existed before railways were developed. But it was the installation of an infrastructure that enabled these machines to run on a road with low friction and thus in an energy efficient way. Once the system installed, railway companies could start innovating with different types of services, and develop special travel arrangements such as holiday packages, overnight sleepers, mail services, etc. Is something similar happening now ?

² These case studies are published by INSEAD and available through the European Case Clearing House

If so, would it be possible to learn some lessons of these previous moments of turmoil about how to manage innovation ? We argue that the past research results can provide answers to three types of questions :

- a. infrastructure seems to be an important enabler of internet applications; how do you as fast as possible from the process innovation in the infrastructure to the creation of a multitude of service and product innovations that leverage the infrastructure
- b. internet applications are about the use of information to create new services; can we learn something from the development of service innovations about innovating in the internet world?
- c. introducing innovations is about fighting friction in adoption of innovation; how have pioneers that exploited discontinuities in technology done this in the past ?

2.1. From efficiency improvement through process innovation to exciting product innovations

Let us first explore a bit the conceptual literature. Typically when an infrastructure is put in place, albeit gradually, one can observe what Barrasⁱⁱ has called a *reverse product life cycle*. He proposed a life cycle that consists of three phases. In a first stage the applications of the new technology and the technological infrastructure that it enables, are designed to increase the efficiency of the delivery of existing services. In a second stage the technological infrastructure is enhanced to improve the quality of services. In a third stage, the technological infrastructure assists in generating wholly transformed or new services.

An example may help to understand this. The sequence of these three stages is what we have seen during the creation of the hub and spoke approach in the airline industry. The early hub and spoke systems were indeed first aimed at improving the cost efficiency of airlines. But fairly soon it has enabled passengers to have more choice, more flexibility, and perhaps more clarity in the structure of the routes. More recently we have seen a number of innovations in the airline industry through the linking of those hubs in regional or global alliances.

As we saw in our cases, we are witnessing a similar evolution in Internet and Intranet applications. Indeed the survey that we discussed in the introduction suggests that of a number of large organizations which were using internet in 1997, and 1998, more then 2/3 were simply providing information, 1/3 were organizing transactions on the net, and were thus improving efficiency and perhaps the quality of their relationships with customers, but only a few were engaging in the transformation of their business proposition. The numbers may have changed somewhat since 1997, but recent press reports indicate that the general trend that is described in this study is still true to a large extent. This all sounds very familiar to the incumbent who wants to use the internet to innovate. First we saw the development of the infrastructure. Then we used the internet to provide information and perhaps some transactions similar to what we do in the old fashioned world. But now we are challenged to review the business models and provide radically new approaches through the virtual channel. This evolution is clear and perhaps a no brainer. How can we speed it up is probably the more interesting question.

The issue of speed is important. We know from studying innovation processes that the earlier one enters a new emerging business the greater your chances for success will be. Every emerging sector

or application of new technologies goes through a phase where 'anything goes': barriers to entry are low and entrepreneurs work through trial and error to find out what the customer wants. Moreover the earlier the company experiments in the internet world, the easier it will be to create externalities out of complementary assets, i.e. construct brand image, build up experience with electronic payments, etc., and thus create barriers to entry for others. The early entrance of Amazon, in the distribution of books has clearly created an advantage over Barnes and Noble or other late comers. -- This doesn't mean that these barriers cannot be overcome, but it will require resources and a lot of commitment!

Our proposal here is that existing firms probably need to experiment with a *sequence* of efficiency improvement, quality improvement in innovation or transformation of the business processes. But it makes a lot of sense to ride down this sequence in the shortest time possible in order to create hurdles for the other entrants.

2.2. Riding down the reverse life cycle : yes, but how ?

Speeding up the evolution from efficiency improvement to the development of new business models basically requires us to reduce the friction that stops us or the customers to adopt the innovation. What kind of friction or hurdles exist for innovating in services?

Traditionally in innovation we have two types of hurdles: adoption hurdles and realisation hurdles. Adoption hurdles are hurdles, which slow down the service provider in the roll out of the innovation. Typical examples are :

- the price/performance hurdle
- the risk attached to the investment to be made by the service provider
- the ease of use of the innovation

Adoption hurdles happen to be correlated with the size of the discontinuity in the technology that is used. The more the innovation differs from the past, the more friction and delays those hurdles will create.

The pendant of the adoption hurdles are the hurdles to realise the benefits of the innovation. These are the hurdles experienced by the user of the innovation. They prevent the user from getting the full benefits of the innovation, even if he or she adopts that service innovation. Typical examples of such realisation hurdles or barriers are :

- the market structure of the group of users: a oligopolistic market of users usually does not see an advantage in 'rocking the boat'
- the lack of potential opportunities created for the innovative adopter over the laggards,
- and the immobilism or resistance to change of the user.

The real current friction in the internet world is probably with the users. It is not the market structure that creates problems. The market structure is to the advantage of innovation. The market for internet applications is resolutely international and thus in many cases very fragmented. There are millions of potential users, and investment requirement for the early trendsetting customers is relatively low: a simple PC and internet subscription are sufficient. The real hurdles have to do

with the mentality of the users. How can they be seduced into changing their habits? Even if the convenience of trading on the net, or buying products or services on the net is obvious, there remains a question whether such convenience outweighs the disadvantages. These disadvantages can be for example the delays in delivery, uncertainty about the quality, or perceived security issues related to paying by electronic means, etc. The software problems of Charles Schwab or E-trade in March 1999 have demonstrated the vulnerability of the convenience advantages.

Equally important are perhaps the hurdles created by the insufficient potential opportunities created by internet applications. Buying two books from Amazon and buying stock for 5000 via internet and playing with it may be a fun experiment, but does it really change the consumer's behaviour. The breakthrough will only come when a consumer with a problem, will first think of internet, before searching to other possibilities. Such a fundamental change in behaviour will not come through a few excellent, but relatively isolated applications. Successful innovation may require bundles of related services, which act as a network via internet, and which create a captive customer base.

What do we learn from previous research ? The key hurdles in Internet are the need to guarantee quality over the net and to render the net attractive enough so that one gets enough market share of the users' brains, when he or she has to fulfil a need. Innovation on the internet requires incumbents to invest in a major improvement in the quality of what is offered to the internet customer, but equally importantly to work on the integration of internet services into a network of related services.

2.3. Innovation on internet is service innovation

Conceptually a new technological infrastructure enables us to make changes on three levels in the delivery of a service:

a. First it can alter the place of delivery: very often it enables us to move the delivery from the point of production to the point of consumption. Home banking or financial services à la Charles Schwab bring the transaction from the bank office or your financial advisor to your desk. Distribution of books or other goods via internet enables you to make choices at home, and to discuss about the merits of a product, through a chat group, again via your computer at home.

b. Secondly it changes the qualitative nature of the service: very often it enables the service provider to offer more choice, more flexibility, and the same time it provides more transparency. The Auto-by-Tel case makes this point over clear. And just think about the difference between a customer who visits a hypermarket, e.g. Carrefour or Walmart, and the one who orders over the net. The moment you enter a hypermarket, one almost commits an act of faith that the particular hypermarket will offer the desired products at the lowest price for performance. The internet surfer can compare easily the offerings from different suppliers, and this probably in less time than she/he would use to go shopping.

c. Thirdly it completely changes the relationship between the service provider and the customer. Amazon's electronic bookstore is an excellent example of this. In a traditional bookstore the shopkeeper is in many cases an informal adviser and the customer is basically in charge of the logistics, i.e. selecting the books and transporting them. The electronic

bookstore redefines this relationship completely. Chat groups and billboards with readers' comments replace partially the advisory function of the bookseller. It is the reader-'colleague' who provides the advice, not the librarian. But logistics become now an integrated and possibly very lucrative part of the service provided by the seller.

This last point deserves a bit more explanation. Services differ from normal production systems because of the overlap between service users and service providers. The most important design parameter of a service system is precisely the degree of " overlap " between customer and service delivery system. The internet infrastructure provides us overnight with many more degrees of freedom in the design of service delivery systems. Interestingly enough they can be changed in both directions: an increase or a decrease in overlap! E-trade is an example where the overlap is reduced to a large degree to what is essential. Home banking is an example of reducing the overlap, because there will be a delay in time between the moment you dial into the system, and the moment the transaction is executed. On the other hand we see that the electronic bookstore, as designed by Amazon, actually increases the interaction. In a normal bookstore you may have a short chat with the storeowner, and pick up your books. Through Amazon you can actually contribute to the reviews of the book, understand how the book is related to other publications; learn more on the author, etc. Implementing innovation in the internet world offers a tremendous amount of opportunities to experiment and innovate with the overlap between customer and service provider. And the nice thing about a new technology like internet is that it offers a great opportunity to create some major stepwise changes in the way we interact with the customer.

2.4. Discontinuities in technology: Are there lessons from the past?

The transformation and innovation in the infrastructure based service, often provides a major discontinuity with past practice. Witness the difference between E-trade and traditional stockbrokers. What do we know about the management of that discontinuity?

The best model to begin to understand this is the technological life cycle proposed by Abernathy and Utterbackⁱⁱⁱ. This model is so well known that it barely requires any description here.

The unit of analysis in this model is a new technology, or new combination of existing technologies. The model argues that you can distinguish four stages in the development of the new technology. In the first, fluid, stage, there will be a high-degree of activity in product innovations, which are offered to the market. There are several reasons for this, but the main two ones are the low barriers to entry, and the difficulty to carry out market research in emerging markets and thus the need to experiment. This first phase usually leads to the emergence of what has become commonly known as a dominant design. It has lots of scientific descriptions, but in brief it is a sort of milestone in an industry. In a sense the product that becomes a dominant design embodies the requirements of many classes of users, even though it may not perfectly match the requirements of one particular group of users. The emergence of the dominant design changes the nature of the competition completely. From competition based on the functionality of the product, one moves to a competition based on cost and quality. The challenge is not any more to define your product, but to offer a product similar to the one from the competition at a lower price. That requires usually heavy investments in automation, business reengineering and a much leaner organization. This is a period of intensive process innovation. Finally, there is a fourth phase in the technological life cycle, when innovation, both in process and product, becomes less relevant to the survival in the

competitive arena, and where the context in which, and the amenities that come with the product, are an essential element of the competition.

This model has been developed for hardware products, and was probably most appropriate for complex assembled products. But we would like to argue that at least the description of the first phase, as well as the idea of the emergence of the dominant design, have a lot of value to process of innovation in the internet world. The different players in the Internet industry may actually be in different phases of this model in early. Let us for sake of simplicity divide the players in four groups: the access providers, the portals or search engines, the browsers and the applications. For browsers and access providers we may already have something close to a dominant design. No wonder then that we see a shake out in these sectors and an emphasis on efficiency and lowering of costs. The portals are still offering different options, but we witness perhaps the emergence of a dominant design. But for the applications we are in virtually every sector still in the fluid phase. There we are still witnessing an environment where entry barriers remain low, and where it is far from clear what the functionalities are for which the customer is prepared to pay. In many cases market research cannot yet answer questions we may have about consumers' behaviour. We can perhaps expect that in the near future a number of dominant designs will emerge about how internet can make a serious impact on how businesses will transform themselves.

If we accept this, then we can ask ourselves what we can learn from previous experience with discontinuous innovation, i.e. when new technologies or a new combination of existing technologies hit the market. Four observations seem to be particularly interesting:

- 1. The face of "fluid" innovation requires very flexible organizations. The competition between different service providers is based on the intrinsic functional values you can offer to the customer. Since traditional market research remains relatively silent about what the user/customer needs, there is only the method of trial and error left: you have to offer functionalities to the customer, observe how he or she reacts, and adapt your product offering accordingly. We observe this very clearly in internet based companies who offers several beta versions of the product, and who have developed the capability to quickly adapt their service in delivery system. This need for fast reaction is enhanced by the competition. Since the entry barriers are low, new entrepreneurs will constantly join the competitive arena. They will offer new ideas, new features. You not only have to react quickly to customers' opinions about job products, but you need also to react to these competitive challenges. This ability to react, requires an enormous organizational agility, and thus entrepreneurial, organic structures.
- 2. The fluid innovation phase can also has seen as a phase of definition of a design concept as well as the definition of new boundaries for an industrial sector. As Prahalad^{iv} suggested, the period after the discontinuity is a period during which the borders of sectors are very fuzzy. Sectors are redefined, and the dominant players in the sector are thoroughly challenged. There are enormous opportunities for start-ups. Is Amazon in book sales, and thus a competitor for Barnes and Noble? Or are they honing a distribution system, which tomorrow can be used for many other products, which require a complex exchange of information at the reader/use of?

- 3. The fluid phase requires a learning driven strategy as opposed to customer, market or competitor driven strategies. Every step a company takes must have a strong learning component³.
- 4. The fluid phase is also a phase where around the design a coalition is built, i.e. the dominance or quasi standard is created. A dominant design is rarely the outcome of the action of a dominant player. It may have been the case for IBM when it defined the PC. But even there the PC became dominant only or rather precisely because IBM, in contrast to Apple Computer, had the bright idea to open up its design to all its competitors. This open design, which was also strongly advocated by Microsoft at that time, has created de facto coalitions to promote the PC concept, and has helped to define the PC as a dominant design.

2.5. Learning from the past : a summary

Perhaps it would be good to summarise what we see as major lessons from the past before we venture in what we see as major differences:

- 1. We know that the implementation of a new infrastructure will enable efficiency improvements, followed by quality enhancements and finally new services. The challenge is to run faster through this sequence. We are convinced that the three major elements of friction in the adoption of new internet based business models by the customer will be in the price performance relation of the value proposition, the quality of the interaction and delivery process and the comprehensiveness of the set of services that will be offered to the user.
- 2. Internet is a great tool to get drastic changes in the design of the overlap between the service provider and the customer. Mind you, that drastic change can go in two directions : increasing or reducing the overlap !
- 3. The past experience with technological discontinuity reminds us of the fact that we need more flexible organizations, a willingness to question the existing industrial organization and the need to build coalitions and communities of partners in order to create the quasi standard.

3. But what is new about innovation through internet?

3.1.Managing in the fluid phase of the technological life cycle

In traditional innovation management and in particular in industries, which have already a recognized dominant design, the name of the game is very often profit management. This is to a large extent defined by the capability to squeeze as much profits as possible out of a product by prolonging its life cycle or by proliferating (without creating too much complexity) the number of variations on the base product. The underlying idea is to optimize the return on investment in R&D. In the Internet applications we witness a different behavior. Many companies rapidly render obsolete their own product in order to keep an advantage over the competition. This is the consequence of the very low investments needed to copy a good internet idea, and the impossibility to protect well the original idea. The only way to stay ahead of potential competition and to create customer loyalty is by continuous innovating. Therefore we see that as soon as a product or a version of a service is launched, that new products are prepared and the destruction of the old

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product is planned. The rapid sequence of versions in portals or the constant change of a site like Yahoo! illustrate this clearly. Very often this goes beyond the product. Also the organization has to be rethought. This process is one that we will call *self deconstruction* : the organization has to constantly reinvent and reconstruct itself.

In order to be able to implement this self de(con)struction as well as to be able to react quickly to the bright ideas that the competition may have developed or simply announced, these companies must also have mastered the ability to quickly *run experiments*. They must also be able to turn the results of these experiments into full-blown products (or kill them). Experimenting very often becomes simply a way of life, and appears normal to the employee of the internet company.

3.2.Exploiting and leveraging the network aspects

Internet companies live with the *community of their customers*. Building such a community is much more than building a loyal customer base. Contrast it with a normal service, where the service provider offers the customer the service. Yes in a restaurant, a ballet, or a movie theatre the cook or the performing company delivers the service and invites the customer to consume, while the service is offered. But there is neither the notion of community, nor of real participation. Internet has in that sense more of experimental theatre where you have to participate in the act.

3.3. Desintermediation and partnerships

Some of the consequences of the ease with which one can get access to services via internet, have led to what has been called the *desintermediation*. Many service companies have made money till today by mediating between providers of partial services and the final customer, who prefers a package of goods and services. Many financial service companies do this, it is the essence of travel companies, relocation services, etc. Most of these intermediaries flourish in an environment where the information about the primary service providers is too complex or insufficiently available.

The alter ego of this desintermediation is that the consumer starts to develop *micro-consumption* behaviour, i.e. he or she consumes/buys a little bit, a small element from each of the suppliers. On top of that he or she has in the time of a few finger clicks information about alternative suppliers at his disposal. How do you survive in such a world as a supplier? Our answer is that it will require specialization and investment in formal or virtual partnerships. The survivor will be that provider who credibly can offer the most specialized, and up to date services. But the consumer is probably also interested in some help of where to find good complementary services. Thus I need as an internet based supplier to have some agreement with other companies I may want to refer to.

This has also a flip side : as an Internet service provider I may refer to others, but others may refer to me. They will create a (perhaps false) impression that you are linked with each other. They suggest a partnership or an alliance. The internet world is full of 'suggested partnerships'. One of the key success factors in succeeding with an internet innovation is precisely how one can keep control over this *network of partnerships*.

3.4. Different organizational processes

Twenty years of research on innovation and the development of new processes and products have resulted in many questions, but also a few strong results. One of those is that a good development and innovation process requires a stage/gate approach. A few years of successful innovation in the

internet world have created a lot of doubts about this approach. As was already suggested with the description of Microsoft's development processes in 'Microsoft Secrets', and their daily build approach, the development process in the internet world is much closer to *the spiral model* that was described for software development. This models assumes that one will go rapidly through a repeated series of the different phases of the development process (spec definition, build, test and launch), each time with as a result an increased performance. This is perhaps to be expected, because internet products are about software development. But we saw in our examples that this approach is in many cases extended far beyond the software development, into the product definition and into the design of the complementary assets that are needed to deliver the final service.

These different processes, different approaches require a different type of organization and inspirational leadership. The nineties were a period of flattening and flexibilising organizations. But the internet innovation pushes these concepts to their limits.

3.5. Overnight internationalization

It was almost a paradigm in service management that services don't travel well. The necessary interaction between the customer and the service provider required the provider to be there were the customer chose to be. Growth in the service industry and internationalisation very often required duplication of assets, franchising, etc.

Telecommunication has changed this completely. Overnight we have been projected in a world where a small one person company that offers a service on internet can cater to the world. A company like Celebrity Sightings has perhaps 7 employees in 1997, but could bring into contact with each other the teenagers from Australia, South Africa, Mexico and the United States in chat rooms centred on US teenage stars. This internationalisation has become technically easy and requires little investment, but we miss perhaps the preparation to offer an effective international service, which is culturally and structurally adapted to the demands from customers from different continents.

4. Conclusion

Based on a series of case studies of both incumbents or legacy companies and internet start ups we have tried to show how important innovation is and how the process of innovation in the internet industry is both similar to what we have seen during other periods of technological discontinuity and at the same time dissimilar of what we know from earlier research. In the 'new' characteristics of the 'new' economy we have emphasized issues such as self deconstruction, the need for experimentation, the building of a community of customers, the combination of disintermediation, micro consumption and the organic development of a network of partnerships, the spiral model of innovation, the need for inspirational leadership and the overnight internationalisation.

ⁱ Dutta S.,

ⁱⁱ Barras R.

ⁱⁱⁱ Utterback J. and W; Abernathy

^{iv} Prahalad