

# Digital Business Strategy: Technology-enabled simultaneous formulation and execution<sup>1</sup>

Espen Andersen<sup>2</sup>  
Associate Professor  
Norwegian School of Management  
espen.andersen@bi.no

## Abstract

This paper discusses the processes for innovation adopted by companies in the face of electronically based competition. It is argued that because of the gains in IT performance, information processing and communications are now free resources, forcing companies to adopt processes for strategic reexamination on a continuous basis. These processes will be of two kinds: “Strategy out” processes, which reexamine the role of existing assets and try to increase their utilization through redeploying them in new economic contexts; and “strategy in” processes which deal with changes to the existing business environment, primarily in the form of new technology, and how these new elements can be identified, fitted into the current organizational set of activities, and exploited.

## Introduction

In the Spring of 1995, the American rapid parcel companies Federal Express (Fedex) and United Parcel Service (UPS) both introduced, practically within the same week, a new service at their web sites: The ability for customers to track the status of individual packages, based on a package number. The capability was very successful, leading to cost savings (Fedex could reduce their investments in staffed call centers) and differentiation (both Fedex and UPS showcased this technology in their advertisements at the time). For the competition, the situation was very different: Within one week, one large competitor received visits from its two largest customers, carrying color printouts of the Federal Express and UPS sites, demanding that the company create a similar capability *within six weeks*, or they would take their business to FedEx or UPS.

This anecdote illustrates two implications for of electronic commerce for companies yearning to enter the digital age: The speed of change—the time from a time from a strategic initiative gives competitive advantage to when it becomes a strategic necessity is now six weeks—and the importance of pervasive information technology within the corporation. While the implementation of a Web page is technically and financially trivial, the creation of the underlying systems, the technical infrastructure and the organizational processes that enable the capability offered through the web page is anything but: Both Fedex and UPS has spent

---

<sup>1</sup> Presented at “Managing in an Interconnected World”, Strategic Management Society 17<sup>th</sup> Annual International Conference, Barcelona, Oct. 5-8, 1997.

<sup>2</sup> The author wishes to acknowledge the inspiration and contributions received from discussions with Richard W. Pawson, Paul Turton and Anthony DiRomualdo of Computer Sciences Corporation Research Services, Cambridge, MA, USA and London, UK

years and enormous resources developing their IS capabilities, allowing them seemingly effortless to present new business offerings through information technology.

Fedex and UPS are able to compete in this market because they show mastery of *increasing utilization of their existing resources* – in this case, their information systems and physical distribution infrastructure – and *taking advantage of new technologies* – in this case the World Wide Web. Both capabilities will become increasingly important for more companies, in more industries. But *how* will companies do this – specifically, what will the processes they adopt to achieve mastery in resource utilization and new technology adoption look like?

## Background

The density of microprocessors doubles roughly every 1 year/2years<sup>3</sup>  
“*Moore’s Law*”, Gordon Moore, 1965, 1975

The increasing ubiquity of information technology, most visibly represented by the Internet, is changing the business environment for companies in many industries. The technology enables not only cost reductions or product differentiation (McFarlan 1984; Porter and Millar 1985), but for many industries became the arena for business innovation (Pawson, Bravard et al. 1995; Quinn, Baruch et al. 1996), the dimension in which innovations are conceived, designed, developed, implemented and presented to customers. In this new business environment, termed a *digital world*, information processing and communication are, in effect, free resources, enabling companies to reach any customer or supplier they want, and, once reached, present any kind of information to them. Since competitive advances based on information technology in general are easily copied by the competition (Hopper 1990), a companies competitive position is primarily determined by its ability to innovate rather than its ability gradually to improve factor utilization or resource acquisition.(Mata, Fuerst et al. 1995).

When designing and implementing strategic initiatives, companies face two continuing dilemmas: How to increase use of the resources they have, and how to identify and respond to new threats and possibilities in their environment. For most companies these activities have tended to be either recurring at regular intervals, for instance in connection with budgeting or planning processes, or they have been single instances of activity, prompted by changes in the external environment. When the rate of change in the environment dramatically increases, organizations will need to adopt processes to undertake these activities on a continual basis. We refer to these activities as *strategy inside-out* (taking what resources exist in a company applying them in new contexts) and *strategy outside-in* (taking new external developments and making use of them in the design, production and marketing of existing business offerings).

The processes of *inside-out* and *outside-in* are similar to processes done in the development of certain kinds of information systems, namely systems developed to support change on a continuous basis. Based in the concept of object-oriented programming (Taylor 1990), these

---

<sup>3</sup> This figure is mostly referred to as “18 months”. According to Moore himself, he first said “every year” in 1965, then moderated it to “every second year” in 1975. Sometime later, someone apparently averaged the numbers and the myth of the 18 months was established (Scott Rosenberg, Salon Magazine, Oct. 1997)

systems are characterized as consisting of many small, largely self-contained modules that interact with the environment through a common messaging infrastructure. Programming the system consists of specifying which modules are to be executed in what order, these specifications are themselves callable modules, and all modules can create (instantiate) copies of themselves. Any new capability introduced from the outside is immediately available to everyone in the system. Object oriented systems are characterized as extremely capable of rapid change, high conceptual robustness, and high reliability. On the negative side, they are extremely resource-intensive, appear complex and hard to measure to the outsider, and require years of training to understand and develop<sup>4</sup>.

In object oriented development, the process of *inside-out* is the process of taking specific components (for instance, an object developed for a specific need) and further developing them to make them useable in more contexts<sup>5</sup>. The process of *outside-in* is the acquisition of new capabilities from the outside, and their introduction to support all the components. In organizational terms, the first process is *abstraction*—“finding out what business we really are in”—and the second process is nothing less than a continuous, high-speed version of Lawrence and Lorch’s (1967) *differentiation and integration*.<sup>6</sup>

### **Strategy *inside-out*: Business Componentization and Repositioning**

The process of strategy *inside-out* involves at least three steps: The *identification and description*, at an fine level of granularity, of the physical, human and informational resources that are unique to an organization; the *componentization* of these resources, where the resource or capability is decoupled from its current context and given its own interface, often in the form of an internal marketing apparatus; and the *repositioning*, often in combination with outside resources, in new competitive contexts. The main challenge in the first step lies in moving the description of the resources to a sufficient level of abstraction, and to apply a critical eye to whether the characteristic of the organization really is as unique (as opposed to the many “we deliver world-class service”) as one would like to think. The main challenge in the second step lies in keeping the cost of the interface down. The main challenge in the third steps lie in managing the demand contention between the new uses of the resource and the previous.

---

<sup>4</sup> Paradoxically, the programmers who are most skilled in traditional computer systems development have the hardest time getting used to object oriented development—most of the training time is spent *unlearning* (Andersen and Konsynski 1991).

<sup>5</sup> While object-oriented theory specifies that development takes place through *subclassing*—taking a generic object and making it specific, observations from actual programmer behavior shows that this process operates in the opposite direction—*superclassing*—programmers first develop one or more objects to deal with specific situations, then take these objects and create a generic object where the specific behavior is accomplished by parameterization (Ø. Fjeldstad, personal communication).

<sup>6</sup> The linkage between organizational and computer system development is nothing new in itself, both academic (for instance, Katz & Kahn (1966) or Morgan (1986) provides examples of organizations viewed as systems, both in a theoretical and metaphorical sense. March and Simon (1958) distinguishes between innovative and control activities of organizations and recommends separating them so both can flourish. More recently, the whole business process reengineering movement (Davenport 1993; Hammer and Champy 1993) is in many ways the application of views of systems development on business organizations, primarily in the form of principles-based organizational processes and information theory.

This process of self-reexamination is typically only undertaken in organizations when a crisis, often prompted by external changes in the business environment, are taking place. Such changes may be deregulation, new ownership, or changes in technology. Typically, the self-examination is undertaken too late, especially in the case of new technology (Christensen 1997). Since Internet technology is changing the business environment for almost all business organizations, and the introduction of Internet technology cuts across functional and regional boundaries, it is now undertaken in many organizations.

### *An example: The Post Office*

The postal services are, in most countries, publicly owned and run organizations, mostly non-profit, with goals that are oriented towards performing a public service under conditions of monopoly, but often with parts of their activities (such as financial services or business package delivery) subject to competition. They face competition in the business parcel and courier market from global communication companies such as Federal Express, DHL and UPS, and a substitution threat from electronic communications. The organizational legacies include a large and geographically distributed workforce, strong unions, considerable rigidity in the organizational structures and procedures, and an institutional responsibility for serving the residual markets after the private companies have picked off the geographically and socioeconomically juicy parts.

In the face of such considerable challenges, postal services providers around the world are reexamining their assets with an eye to how they will work in this new business environment. One postal service (hereafter referred to as PostOffice) recently underwent a process of self-reexamination with an eye to identifying capabilities they had that were unique to them and could be exploited in a digital environment. Their process and conclusions are interesting because while the unique characteristics it is common to many such services around the world, the choice in new offerings varies widely:

First, PostOffice identified three future market domains:

- Physical: Business services and activities that would stay physical in nature (that is, not be subject to the “atoms to bits” conversion (Negroponte 1995))
- Digital: Business that would go digital, i.e. be conducted primarily through electronic means and channels in the future
- Switchable: Business that would be switchable, i.e., would go from atoms to bits (or the other way) within the boundaries of the organization.

Secondly, a management team at PostOffice examined their current production infrastructure and market offerings, concluding that there were at least four distinct differences between them and their competitors in the parcel transportation business:

- PostOffice has both local and regional sorting and distribution, as distinct from the model of the rapid transportation companies, which to a much larger extent tend to move all packages to a central location, where they are rapidly sorted and moved out again. This means that PostOffice has cost advantages for local transportation, especially for transportation that is price-sensitive and high-volume in terms of the number of parcels
- PostOffice has local, physical presence in the post offices, with competent staff for transactional activities. This means that they can offer services which must (at least with

current technology) involve some sort of human intervention or validation, such as the granting of passports or interaction with other governmental services

- PostOffice have trust with the public to an extent the private companies have not, meaning that they can, as an organization, be a guarantor of certain qualities in a product or service where trust is necessary. They can also access certain segments of the public who needs this trust, especially the elderly.
- PostOffice is, by law, an agent of the government, thereby having an official status, including certain law-enforcement-capabilities<sup>7</sup> (for instance against people who tamper with mailboxes or obstruct mail)

A strategy for a digital world would then be to address the three market domains, trying to exploit their differential capabilities. While most Post Offices around the world share at least some aspects of these capabilities, their approaches to addressing them varies widely, as this table will show.

	Local/regional distribution	Local, pervasive human interface	Trust with the public	Law-enforcement capability
<b>Physical business</b>	<ul style="list-style-type: none"> <li>• Physical services with local fulfillment, such as distribution of groceries to homes (Norway, US)</li> <li>• Package tracking (Sweden)</li> </ul>	<ul style="list-style-type: none"> <li>• Act as interface to other services (US, Norway)</li> <li>• Let local businesses give postal service (Norway, Sweden))</li> <li>• Franchising of post offices (UK)</li> </ul>	<ul style="list-style-type: none"> <li>• Sell mobile phones (UK)</li> <li>• Acquire private parcel service (Netherlands)</li> </ul>	<ul style="list-style-type: none"> <li>• Capitalize on Mail Fraud Act (US)</li> </ul>
<b>Digital business</b>	<ul style="list-style-type: none"> <li>• Subscription service (UK)</li> <li>• use of imaging and electronic communication to speed up processing (US, UK)</li> </ul>	<ul style="list-style-type: none"> <li>• pre-processing of trusted transactions, such as certification of encryption keys or email addresses (US)</li> <li>• equipping mail carriers with handhelds</li> </ul>	<ul style="list-style-type: none"> <li>• Sell Internet commerce space (Sweden)</li> </ul>	<ul style="list-style-type: none"> <li>• Serve as encryption key holder (UK)</li> </ul>
<b>Switchable business</b>	<ul style="list-style-type: none"> <li>• Hybrid mail<sup>8</sup> (UK, US)</li> </ul>	<ul style="list-style-type: none"> <li>• local scanning/OCR and electronic distribution of reply cards (US)</li> </ul>	<ul style="list-style-type: none"> <li>• validation of conversions</li> </ul>	<ul style="list-style-type: none"> <li>• conversion services to fulfill format requirements</li> </ul>

The Post offices is an example of the identification of unique attributes of an organization, and the subsequent utilization of these attributes in construction of service offerings that are difficult to replicate by competitors.

### *A second and third step example: General Electric and the Trade Process Network*

The second and third steps of the outside-in strategy process are the componentization and repositioning of an internal capability. This is a process that has occurred in many companies where information technology has been used for strategic advantage. For instance, American Airlines has, with its well known SABRE computerized reservation system, gone through a

<sup>7</sup> In the US, the fact that a shipment is sent through the postal service imbues it with a certain legal status. Fraudulent business practices fall under the Mail Fraud act, meaning that many shady businesses conduct all their correspondence through courier services, so as not to become prosecutable under this law.

<sup>8</sup> Hybrid mail is a service where companies can send an electronic message to the Post Office, which then sends it on in electronic or paper form, depending on the receiver's preference. This is used by software companies for product updates.

process of internal addressing of operational need (McKenney 1995), market expansion through control of customer interface (Copeland and McKenney 1988) and superior systems optimization (Smith, Leimkuhler et al. 1992), and then external sale of the internal capability (Hopper 1990). American started the initial development of SABRE in 1957 and first used it competitively in 1976. As the initial Fedex/UPS example shows, the speed with which this process will need to take place has for a competitive advantage to be created is increasing dramatically.

General Electric is an example of a company that has heeded this call for speed. In GE Lighting, a division that produces light bulbs, a process for soliciting and awarding bids for parts production through the Internet was developed. This process handled procurement of parts and materials for 46 plants around the world, from more than 25,000 suppliers. While simple in concept, the procurement process used to be complicated and costly, with part drawings and bid specifications put together manually and RFQs (requests for quotes) written and mailed to current and potential suppliers.

In early 1996, GE Lighting transferred its parts bidding to a set of Internet-based processes called the Trading Process Network (TPN). Announcements of Requests for Quotations (RFQ's) are now done through electronic mail, fax or telex (as each individual supplier prefers). The RFQ itself is available electronically on the Internet, with all the blueprints pulled together automatically from GE Lighting's databases. The suppliers are given 7 days to prepare and submit their bids electronically over the Internet. The bids are then evaluated and awarded the same day, and orders may start arriving via EDI to the supplier within 24 hours.

While the TPN achieved significant operational savings in time and money for GE Lighting, it is the next development which makes the TPN an example of componentization and repositioning.. Quickly recognizing the benefits of TPN, GE is now adopting it as the standard way of procuring parts in seven of its divisions, expecting to buy 50% of its parts and raw materials over TPN by the year 2000. This alone will probably provide the critical mass needed to make Internet-based parts procurement a common way of doing business. However, GE is driving TPN even further, and increasing its revenues, by offering TPN as a service<sup>9</sup> to other companies through GEIS, its information technology services company. GEIS already is a major mover in EDI, so TPN will both complement and replace some of its current services.

---

<sup>9</sup> The commercial service offering can be seen at <http://www.tpn.geis.com>.

## Strategy *outside-in*: Technology adaptation and adoption as the game Tetris

The second strategic activity involves the identification and integration (into a corporate infrastructure of technology and services) of outside changes in the environment. For the purposes of this discussion, these changes are seen as identifiable and discrete, not implicit and slow. However, given a digital competitive environment, this assumption is not far from reality: More and more, organizations have to evaluate a stream of technological and business innovations which have to be implemented rapidly into the organizational apparatus, in the form of new business offerings or extensions to current business. The term “Internet time” (Iansiti and MacCormack 1997) has been used to describe the need for high speed of development, accomplished through overlapping stages of development and frequent release of beta models, as well as delay of commitment to increase speed and flexibility of decisions (Eisenhardt 1990).

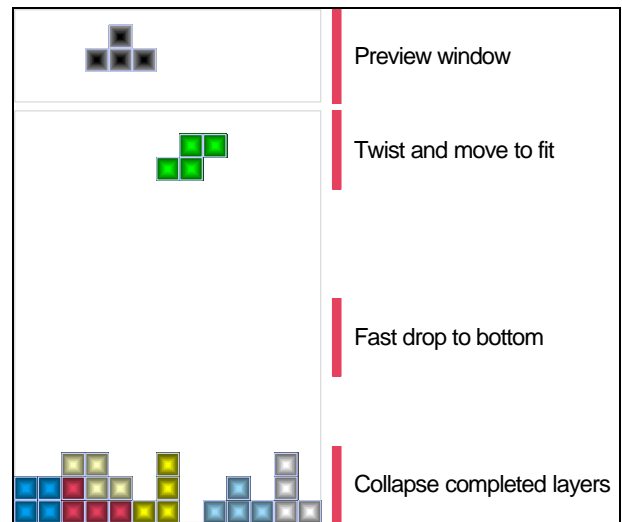


Figure 1: The four key activities of Tetris

By drawing on a metaphor of the computer game Tetris<sup>10</sup>, we can describe certain necessary skills in the process of formulating and implementing strategy in a “high-velocity” (Eisenhardt 1990) environment. In Tetris, blocks of different shapes fall down from the top of the computer screen, and the object of the game is to position the falling blocks so that each one fits snugly with previously placed blocks. The longer the player plays one game, the faster the blocks fall and the more frequently they arrive. Good Tetris players need to master four specific skills, executed in parallel, that closely resemble the organizational skills needed to evolve a business in the digital economy:

- the skill of discovering and describing the new technology and business opportunities appearing in the business environment
- the skill of fitting these opportunities together to form a coherent and complete service or product
- the skill of rapidly scaling up the offering once the commercial viability has been sufficiently established
- and the skill of moving services or processes that no longer provide a competitive advantage off the playing board, to free up managerial and technical resources for the new opportunities ahead.

For the organization, each of these skills are important. However, they are all necessary, but not sufficient, for the ability to compete in a digital business environment. A major problem in many organizations is that strategic development is seen as the implementation of only one of these skills. The problems encountered by such organizations are familiar to any Tetris player—as past, wrong decisions clutter the playing field, there is less and less room to

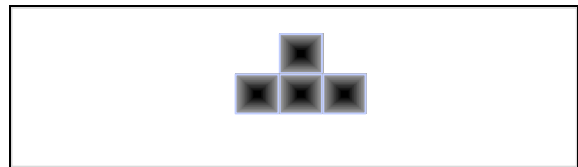
<sup>10</sup> Tetris has an interesting history: The first implementation was done by a Russian programmer, while Russia was still a part of the Soviet union. The game now exists in hundreds of implementations—and whether the originator derived any economic benefit from it is unknown to this author.

maneuver new blocks around, which leads to further cluttering, even less room to maneuver, and the whole playing field comes to a grinding halt.

The metaphor of Tetris is lacking in a number of respects, compared to managing a real organization in a digital world. For one thing, most Tetris games have a "freeze" key, allowing the player to pause the game and think about what to do next. Secondly, every new Tetris game starts with a clean playing field, whereas most new managers will find that someone has been playing the game before them--leaving a collection of blocks put together more to maximize the points score than worry about how sustainable the game is for the next player<sup>11</sup>. Nevertheless, the metaphor—and the mental exercise it facilitates—may enable organizations to define their own processes for dealing with an increasing number of changes in the environment.

### *Skill 1: Discovery: Seeing what is coming*

An organization needs to have some form or future-gazing capability, to have a vision of what is over the horizon. In Tetris, this is called the *preview window*. Tetris players use the preview window to see what the next incoming block looks like. This is analogous to the function of Advanced Technology Groups and other organizational initiatives to predict or anticipate the future, and suffers from the same problems: the link to the existing situation is not direct, and looking too much at the future makes one lose concentration on the present, mistaking observation for action.



**Figure 2: The look-ahead window**

While most companies have some capability for future-gazing, most often the technical aspects of future changes (rather than business implications of them) are emphasized, and the initiative is often either relegated to a special group far from the decision-makers, or distributed through the organization, but without organizational procedures and incentives for surfacing issues and linking them to organizational action. Most new technologies and other business possibilities are known to everyone in the market, but the majority of companies ignore them until it is too late (Christensen 1997)<sup>12</sup>. The reason is often that the company lacks a language for talking about the future in terms that relate to what the company is doing now, and they lack the managerial decision capability to invest in technologies and business opportunities before validation—often in the form of what competitors do—is available.

A variety of techniques for expressing the future in language, and for linking the visions of future back to the organization itself. Shell, the global oil company headquartered in the Netherlands, has achieved widespread acknowledgment for its intelligent use of scenario planning (de Geus 1996) and other techniques for exploring consequences of changes in future business environments. Scenario planning involves identifying trends relevant to the company,

---

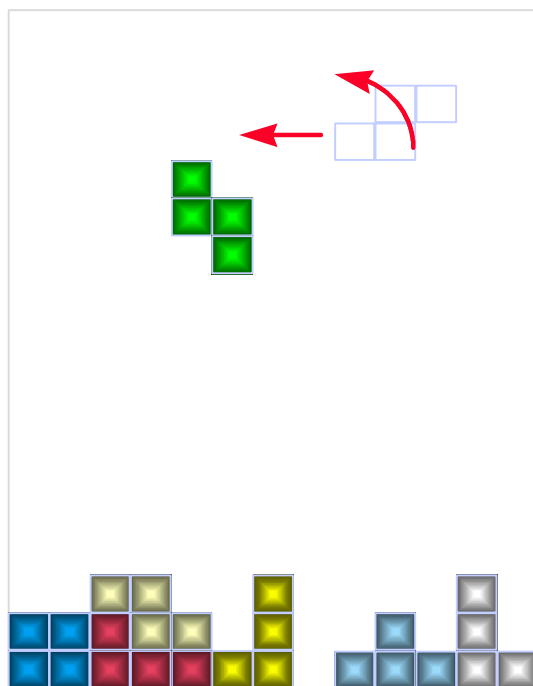
<sup>11</sup> In organizations, this problem could probably be helped by making "future playability" a part of the outgoing manager's reward, as is now seen in a number of consulting companies where knowledge sharing is an explicit part of performance evaluation.

<sup>12</sup> Christensen argues, drawing on a study from the fixed disk drive industry, that this is caused by listening too much to the current customer set, ignoring growing markets and technological advances that fulfill needs outside the organizations' and its customers' established evaluation dimensions.

and then building scenarios – detailed descriptions of possible futures based on those identified trends. Siemens Nixdorf, a German computer manufacturer specializing in solutions for the banking and financial industry, has recently tried to set up an organizational initiative to achieve identification of relevant future trends, starting a scenario-planning exercise called FutureScape (a name that applies both to the process undertaken and the team doing it.) The FutureScape team is composed of young, aggressive middle managers, which are paired with people in top management. The younger people are given the responsibility of ensuring the top managers know what is happening in specific areas of technology. Whether or not this exercise can become a permanent capability (and whether it will influence future strategy) remains to be seen, but Siemens Nixdorf deserves credit for explicitly addressing the issue of linking the scouts to the decision-makers.

From an investment viewpoint, the skill of future-gazing is relatively cheap to acquire and self-contained in its implementation: One can outsource the whole process to one of many organizations who track developments from industry-specific sales and investment trends through changes in technology and macroeconomic dimensions. The main changes from previous initiatives lies in the need to tie the feedback closer to the decision-makers, to maintain a wide scope in the collection of data, and to enable processes (increasingly technology-enabled) within the organization for the necessary communication and abstraction of ideas.

*Skill 2: Fit: Integrating the new possibility with the organization*



**Figure 3: Fitting a new block**

In Tetris, the second skill is the skill of rapid repositioning to make a new block fit. Blocks are integrated into the existing set of blocks by turning them around and/or moving them horizontally so that they will fit into the set of previously integrated blocks. This is clearly the most difficult skill to acquire: It requires quick reactions, a sound knowledge of the existing situation (that is, the set of prior decisions), an understanding of how the new block will affect what can be done with future blocks., and, most importantly, an ability to see a new block from many perspectives at once, so that how to turn and move the block for optimum integration can be immediately decided.

Since this skill is complex, it is difficult to define specific aspects of it to invest in. Consequently, an organization can invest in this skill chiefly by making sure that it invests enough in the three other skills to allow the skill of rapid repositioning

to happen, in effect buying the time to find out what to do with new opportunities. Secondly, one can make sure that the task of experimenting and learning at the organizational interface with the environment is sufficiently high up on the managerial agenda (and in the organizational hierarchy) that these skills are allowed to develop in a way where they can have

consequences for organizational actions. Examples of this include pilot projects, alpha and beta tests<sup>13</sup>, simulations and knowledge-sharing activities. All of these work best when supported by organizational structures, technology and explicit processes.

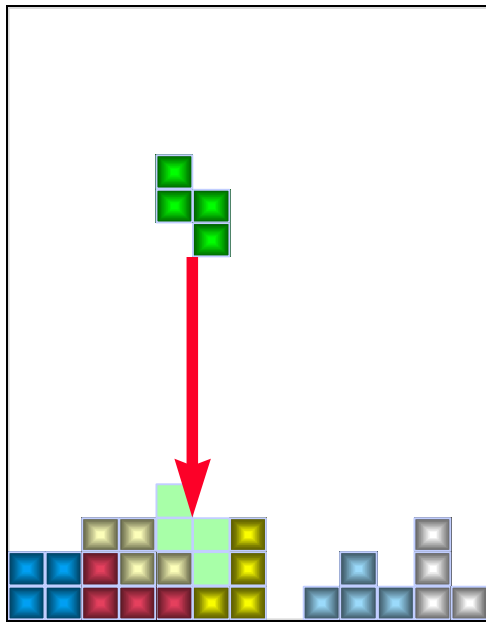
An example of experimentation is a large retail grocery chain in Europe, which decided to go into remote shopping (allowing the customers to order their groceries electronically, and then have them delivered). This organization had previously had a history of implementing new initiatives without testing, but now decided that since they knew very little about remote shopping, they would do some experiments first. They put together a group drawn primarily from their operations research unit, and the group created a number of experimental marketing initiatives which were tested with customers. The conclusions were rather surprising, as the company found that many of their assumptions about consumer behavior were wrong. For one thing, customers did not want to have the goods delivered, because this meant that the recipient would have to be at home when the goods arrived. Instead, the customers wanted to order the groceries, have the shop collect it from the shelf and bag it, and then pick it up on their way home from work. Secondly, the company discovered that while they could sell certain things on the Internet (such as chocolate, flowers and wine), the main market for regular groceries lay in *Intranets*: They would collaborate with other large corporations, which would let the grocery chain have a Web page on the customer organizations' internal nets, allowing employees to order the groceries in the morning from their workstation in their office, and pick up the goods from a truck in the office parking lot as they were leaving for home in the afternoon. This solution had the added advantages of creating a captive market, and allowing payment through direct deduction in wages.

To a certain extent, organizations can rely on defined strategies when dealing with new challenges. In Tetris, a player can, for instance, rely on certain strategies for dealing with blocks that do not comfortably fit in the current set of blocks, such as flipping the block to a vertical position (so it takes as little horizontal space as possible), and then moving it over to the side of the board, to deal with it later. Alternatively, the player can look several steps ahead, and position the block so that it creates a situation that will be solvable, not with the next block, but with one of several blocks the player is expecting to arrive beyond the observable horizon. Common to these strategies is that they are risky and that they require high skill and high tolerance of ambiguity of the player—and, in the case of strategy outside-in, the organization.

---

<sup>13</sup> Often in high numbers: Many companies competing in the market for Internet software use frequent testing with the general public both as a development and a marketing tool.

### *Skill 3: Fast drop: Rapid implementation of understood opportunities*



**Figure 4: Dropping a block into place**

In Tetris, once a player has seen where a new block will fit and has oriented it correctly, he or she can make it drop immediately into place, instead of waiting while it falls at the normal speed. For the skillful Tetris player, this process is automatic. The organizational equivalent is the well-managed technology and business process and infrastructure for roll-out.

The key to rapid roll-out is that it is comparatively uncomplicated and readily definable, because it is conceptually the same for every block that comes along. Therefore it is easy to invest in, provided the organization has recognized it as a skill to invest in.

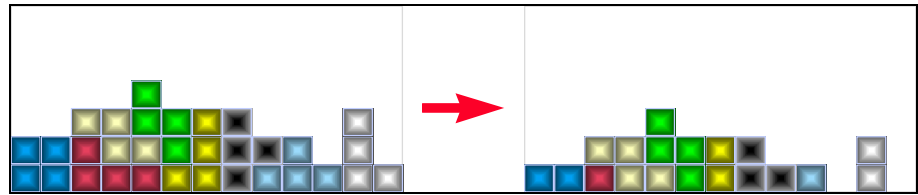
Hewlett-Packard, the global information technology company headquartered in Palo Alto, California, has invested in a global TCP/IP network which now enables the organization to roll out new software worldwide in 48 hours. Though the initial impetus for

setting up the network was data center consolidation and a transition to client-server based administrative systems, later investments have been infrastructural in nature. As one IS executive said: "We didn't know exactly how we would use our network; we just instinctively knew this was a capability our company would need and that our people would find ways to make their [work] more effective."

Another example of generic investment in adaptive capability is Statoil, the state-owned Norwegian oil company, which in the summer of 1997 offered each of its 15,000 employees a free state-of-the-art multimedia home PC with an ISDN connection, with no other strings attached than that the employee go through some computer-based training modules in their spare time. While done in order to increase the general computer use skills of its workforce, there is little doubt that the availability of Internet access and email communication with all employees (and their families) will enable the corporation to become more adaptive through faster communication.

#### Skill 4: Move out: Weeding out attention-grabbing routines

In Tetris, when a layer of blocks is completed, it collapses, and all the blocks above it drop down one level. This provides more space to manipulate falling blocks. The



**Figure 5: Collapsing completed layers**

organizational equivalent is the 'disappearance' of technologies or business opportunities that have become well understood, where margins have shrunk and the competitive advantage has disappeared. The weeding out can take many forms, including automation, outsourcing, and spinning off as a separate business; but it is essential in order to free managerial and technical attention for the constant stream of new opportunities.

While easy to describe and, to a certain extent, to measure, this skill is hard to attain because it goes against the basic human instinct for safety. The key to achieving it probably lies in making sure that learning becomes a core skill of the organization, so that each individual accepts a personal responsibility for providing economic value to the business organization, and regards new technology and new business areas as opportunities rather than threats. In Tetris, the only players with room to maneuver are the players that either are very skilled at the game, or the players that just have started. The analogy to businesses in digital environments is obvious, possibly with the exception that large organizations will have enough resources to buy themselves a bigger playing board.

## Conclusion

*Metaphors are tools of thought*  
(Dennett, 1991)

The strategy inside-out and outside-in processes are, of course, not directly transferable from the domain of information systems development to strategy development. For one thing, organizational functionality is not infinitely replicable and scaleable to the extent a computer program is. Neither are people content to work as globs of functionality merely responding to messages, whether they started out inside the corporation or are integrated into it. New business opportunities, whether technologically enabled or not, do not show up in the readily definable format of a Tetris block, with variation in just a few dimensions.

However, the two frameworks presented have proved useful as “tools for thought” in conversations with managers in companies facing competition in a digital world. Lessons from the development of flexible computer systems can inform the strategy formulation process—further research will determine whether they will also characterize its implementation.

## References:

- Andersen, E. and B. Konsynski (1991). *What the Hell is OOPS, Anyway?* Boston, MA, Harvard Business School.
- Christensen, C. M. (1997). *The Innovator's Dilemma: Why New Technologies Cause Great Firms to Fail*. Boston, MA, Harvard Business School Press.
- Copeland, D. G. and J. L. McKenney (1988). "Airline Reservations Systems: Lessons from History." *MIS Quarterly*(September): 353-370.
- Davenport, T. H. (1993). *Process Innovation: Reengineering Work through Information Technology*. Boston, MA, Harvard Business School Press.
- de Geus, A. (1996). *The Living Company: Growth, Learning and Longevity in Business*.
- Dennett, D. C. (1991). *Consciousness Explained*. Boston, MA, Little, Brown & Co.
- Eisenhardt, K. M. (1990). "Speed and Strategic Choice: How Managers Accelerate Decision Making." *California Management Review*(Spring): 39-54.
- Hammer, M. and J. Champy (1993). *Reengineering the Corporation*. New York, Harper Collins.
- Hopper, M. D. (1990). "Rattling SABRE--New Ways to Compete on Information." *Harvard Business Review*(May-June): 118-125.
- Iansiti, M. and A. MacCormack (1997). "Developing Products on Internet Time." *Harvard Business Review*(September-October): 108-117.
- Katz, D. and R. L. Kahn (1966). *The Social Psychology of Organizations*. New York, John Wiley & Sons.
- Lawrence, P. R. and J. W. Lorsch (1967). *Organization and Environment: Managing Differentiation and Integration*. Boston, MA, Harvard Business School Press.
- March, J. G. and H. A. Simon (1958). *Organizations*. New York, John Wiley & Sons.
- Mata, F. J., W. L. Fuerst, et al. (1995). "Information Technology and Sustained Competitive Advantage: A Resource-Based Analysis." *MIS Quarterly* **19**(4): 487-505.
- McFarlan, F. W. (1984). "Information Technology Changes the Way You Compete." *Harvard Business Review*(May-June): 98-103.
- McKenney, J. L. (1995). *Waves of Change: Business Evolution through Information Technology*. Boston, MA, Harvard Business School Press (forthcoming).
- Morgan, G. (1986). *Images of Organizations*. London, Sage Publications.
- Negroponte, N. (1995). *Being Digital*. New York, Knopf.
- Pawson, R., J.-L. Bravard, et al. (1995). "The Case for Expressive Systems." *Sloan Management Review*(Winter): 41-48.
- Porter, M. E. and V. E. Millar (1985). "How Information Gives You Competitive Advantage." *Harvard Business Review*(July-August): 149-160.
- Quinn, J. B., J. J. Baruch, et al. (1996). "Software-Based Innovation." *Sloan Management Review*(Summer): 11-24.
- Smith, B. C., J. F. Leimkuhler, et al. (1992). "Yield Management at American Airlines." *Interfaces* **22**(1): 8-31.
- Taylor, D. A. (1990). *Object-Oriented Technology: A Manager's Guide*. Alameda, CA, Servio Corporation.