6

Multiple Parallel Trials: Selectionism

In Chapter 3, we argued that there are two approaches to project management in the face of unknown unknowns that complement the traditional approach of PRM. In Chapter 5, we described the learning approach and explained how it can be applied. In this chapter, we explore the other fundamental response to unk unks, the one that we call selectionism: trying out several plans simultaneously and seeing, ex post, what works best.

Conceptually, selectionism is easy to understand. Here is a simple definition:

> In the face of uncertainty, one launches several solution attempts, or subprojects, each with a different solution strategy to the problem in hand. If the solution strategies are sufficiently different, one would hope that one of them will succeed and lead to a successful outcome. Success depends on generating enough variations so that ex post, we obtain desirable results.

Let us use a thought experiment to explore what this definition of selectionism implies. Imagine that a military plane has crash-landed in the jungle of Laos, with a nuclear bomb on board. The bomb must be retrieved as quickly as possible, but the terrain is so complex that intelligence is not able to provide good tracking. Moreover, there are guerillas in the vicinity, so the search parties will have to shift dynamically, depending on where they encounter resistance. The military leadership decides to send seven search parties in parallel. Each can earn a huge reward (both monetary and in the form of a Medal of Honor) if they successfully retrieve the bomb. But only one will find the bomb and "win." The others will "lose." Their effort is still necessary, of course, because no one knows in advance which team will find the bomb. This problem has one, and only one, useful target of the search—namely, the place where the bomb is located. Any other place in the jungle is utterly useless for the purpose of this search. Thus, this kind of problem is called a "treasure hunt."

In projects, there is not usually a single useful solution; there are, rather, many system configurations that work more or less well. There are many solutions with higher or lower levels of performance. Finding the best is the challenge.

The challenges of implementing what seems a simple conceptual approach are quite daunting. Does one have the resources to launch several projects? Does one have the mechanism to identify early on the cul-de-sacs? What does one do with the teams that were committed to those cul-de-sacs? How do you remotivate them and keep them on board? And how does one enable the organization of learning the knowledge that a failing subproject often creates? Nature is a master at selectionism. It has a brutal way of getting rid of the failing projects: only the fittest survive. Nature also has a quite sophisticated learning system through genetic selection. Organizations cannot apply the same brutal approach, and need to find sophisticated answers to implement selectionism.

In this chapter, we first illustrate selectionism, and with the example of a small telecommunications equipment company that needed to completely redefine its business model, we will provide a more detailed illustration. Then we explain in more detail what selectionism is and where and how it has been applied. We conclude with a number of suggestions for how to implement selectionism where it is appropriate.

6.1 Selectionism at Option International

6.1.1 Company Background

This section gives an interesting example of how selectionism helped a small telecommunications equipment company to redefine its business model. Option International[1] is a small Belgian company created in July 1986 by Jan Callewaert, an almost prototypical example of an enthusiastic young entrepreneur.

The company was founded to design and manufacture small modems for portable computers. In the early 1990s, riding on the success of GSM (Global System for Mobile Communications) in Europe, it successfully developed a series of modem cards to enable PCs to be connected through a mobile phone with the Internet or private data networks. Small and entrepreneurial, the company decided to distribute the cards through its own networks, assemble the cards in house, and develop its own brand. The business model the company developed was that of a niche player in the end market (both consumer and business) for computer peripherals.

In 1993, Option International scored its first big success with the first PC card modem with pan-European-type approval.[2] In 1995, the company received a great deal of visibility with the launch of its GSM-Ready PC card that combined GSM and PSTN (Public Switched Telephone Network) modem functionalities in a single device. Its success was based on its technological strength. The company's technical team had a thorough understanding of radio technology and knew how to combine it with the requirements imposed by the PC manufacturers. Although in both radio technology and computer technology there were formidable competitors, Option International understood how to leverage its ability to combine these two technologies in a niche market.

Based on its technological prowess and its initial market success, riding on the Internet boom that made all small entrepreneurial high-tech start-ups attractive, counting on an exploding market (the integration of the PC market with the fast-growing mobile communication market), and intending to professionalize its management, Option International successfully floated itself on the Easdaq, the European equivalent of the Nasdaq, in 1997. There was cash; there was a proven business model; there was technological know-how, enthusiasm, and a booming market. How could this go wrong? But soon the clouds in the sky darkened.

6.1.2 The Challenge: An Unpredictably Changing Market

Being a niche player was an advantage, but also a curse. As a technological leader, Option International knew how to sell to early trendsetters, but as soon as a larger market for modem cards opened up, the larger electronic component manufacturers became interested, and the computer manufacturers wanted to embed the functionality within the PC. It became clear that Option was a company with one product, and a product with a short life cycle, moreover. Being successful required constant renewal in that product and staying ahead of the potentially big competitors with strong manufacturing capabilities and large distribution networks.

Moreover, the market became complicated. Hitherto, it had been easy: The consumer had a PC and a mobile phone, and Option was able to connect the two, basically whatever the brand of either. But the market started experimenting with alternative terminals. Mobile phone manufacturers, such as Nokia, launched smart phones that had PC capabilities. If this move became successful, the road warriors would not need to bring their PCs along and would work with a smart phone. No more need for a data card from Option.

In addition, personal digital assistants (PDAs) made inroads into some PC uses and functionalities. PDAs also needed to be connected to the GSM world, but many of the suppliers had proprietary system software. A generic product produced by a supplier like Option would no longer do the job.

Not all the market news was bad. At the end of the 1990s, people in many industries were weighing the advantage of connections over the mobile phone network against remote operators. What about isolated vending machines in places where there were no fixed line connections, that could provide a regular update over the mobile phone network on the evolution of the stock in the machine? Was that a market for a modem card provided by Option? Or what about a fleet of delivery vans where drivers would have a custom-designed terminal to fill in orders or deliveries, that would, over the mobile phone network, communicate with the computers at headquarters? Perhaps an interesting market for Option?

Technologically speaking, Option could design solutions for these markets. But they demanded fundamentally different business models. Rather than selling to the trendsetting (and relatively price-insensitive) road warrior who wanted to be connected to the Internet or his or her company's intranet all the time, Option would have to get into business-to-business marketing and sales. Development timing would have to be coordinated with the customer; sales volumes could be much higher, but so could pressure on margins. This would require a much better mastery of operational processes. And Option would probably lose its visibility toward the end customer. A marketing strategy à la Intel (Intel Inside) did not look credible for a small player like Option, and the big suppliers of PDAs would probably want to sell the modems under their own brand.

The uncertainty about the market was compounded by technological uncertainty. The world was full of rumors about the replacement of GSM by GPRS (General Packet Radio Service) and UMTS (Universal Mobile Telecommunications System). Operators were outbidding one another like mad for UMTS licenses. While the technological trajectory seemed relatively straightforward, at least in Europe, there was the wildest speculation about the timing of the introduction of the successive generations of mobile technology.

6.1.3 Selectionist Trials to Find a New Business Model

On the technology side, Option International pursued a learning approach, as described in the previous chapter. But the issue was still what kind of business model would survive. The direct relationship with the customer? The subcontracting role for major device manufacturers who wanted to embed communication capabilities in their end products? At this point, the company began to conduct selectionist trials.

First, there came an attempt to brand Option products as PC accessories. A logical evolution of Option's own products seemed to be some forward integration, for instance, producing a card to eliminate the mobile phone by turning the PC into a phone. Thus, a card was developed that had an antenna, could incorporate the SIM (Subscriber Identity Module) card of the mobile operator, and could enable (voice and data) communication via a PC. The product was launched in 1998 as the FirstFone. It was a first for the world. The same technology could also be used for a GSM adapter for a PDA. In the last quarter of 1997, the Snap-on, an adapter for 3Com's PalmPilot, had been launched. At the same time, Option International enhanced the GSM-ready card with additional capabilities, such as ISDN, and began to work on the inclusion of GPRS functionalities.

The initial market commentaries about the FirstFone were positive, but the product did not sell well. Did that mean that the direct sales strategy was wrong? Perhaps alliances were needed to sell the product. With this in mind, Option signed contracts with companies such as Omnitel in Italy, T-Mobil in Germany, and Telenor in Norway over the next few years, in order to increase FirstFone sales. While none of these contracts became blockbusters, some interesting lessons were learned. Option discovered that perhaps its product did not belong in a computer shop, or that it might be bought by an industrial client in an independent way. Perhaps the customer, private or corporate, did not see this as a computer peripheral but rather as a communication device, to be bought, like a mobile phone, through a telecom operator.

The Snap-on generated some sales but was not the expected blockbuster, either. Nevertheless, the market for embedded devices or proprietary add-ons to terminals remained intriguing. Option International signed a development contract for a wireless communication module with Handspring, the new PDA producer. Soon afterward, a contract was closed with Compaq to design and produce a GPRS solution for the Compaq iPAQ Pocket PC. Both products were launched within a year, in 2000–2001. Both times, Option had high expectations. It hoped that add-ons to PDAs would lead to a volume business and that this would help the company to make the transition from a startup to a mid-sized company. To be able to respond to the development and quality requirements of its customers, it had to completely revamp its development organization and its manufacturing approach. Development capacity was enhanced by the acquisition of facilities in Germany and the UK (Cambridge), and the production facility in Ireland was extended.

The second selectionist trial was an attempt at a supplier role to telecommunications companies. From making communication add-ons to PDAs to viewing oneself as a development contractor in the communications world was only a small step. Why not build phones around the radio device that Option had already perfected? The question was triggered by a Chinese electronics manufacturer who wanted a fully designed mobile phone from Option. Accepting this contract did not make sense when Option defined itself as a producer of communication cards distributed under its own brand. But as an R&D subcontractor, which it had already become for Handspring and Compaq, it *did* make sense. So the contract was accepted.

None of these subcontracting relationships proved to be very successful. For the Chinese contract, a significant amount of the investment had to be written off in 2002. The OEM contracts with Handspring and Compaq[3] *did* deliver significant revenues, but the relationships remained limited to one generation of the product. In 2001, 94 percent of revenues came from these contracts. Option learned many lessons from this experience, two of which were significant. The market was clearly moving toward embedded products, and the survival of an independent Option brand in the market was unlikely. Second, sales had remained significantly below original expectations, and independent observers of the communication card market had concluded that computer and PC manufacturers had insufficient knowledge to sell communication solutions.

Thus, the first two experiments in defining the business model were unraveling: independent sales of branded Option modules as computer periphery, and design and production for telecommunications OEMs. Yet, a third experiment was ongoing. Option had incorporated GPRS into its own "in-house" card and launched it as the "Globetrotter" in the first quarter of 2001. Now it was looking for the successor, which was to include a 3G solution. Option International could have pursued two market approaches in parallel: the development of an own card as well as the development of add-ons for terminal producers. But a new option came on the radar screen.

Some telecom operators did not have a good understanding of what consumers would do with GPRS and UMTS. It was clear that voice communication did not need these technologies and that they could only make money if consumers used the mobile networks heavily for data communication. Thus, data communication had to be stimulated. The network operators gradually realized that the use of communication cards also needed to be stimulated and that these cards were really essential to the rapid rollout of GPRS and UMTS. As a result, in the first quarter of 2002, Option was approached by Lucent, a telecom equipment manufacturer, to codevelop a high-speed data solution for UMTS networks. In the third quarter of 2003, a direct collaboration with Vodafone was announced. Finally, this trial seemed to work. In both 2003 and 2004, Option International doubled its revenues and returned to a healthy profit, after several years of losses.

This example illustrates how this small company followed a fairly straightforward trajectory with respect to its technology, but had to develop a totally new business model. The business model had to be redefined because Option International was confronted with enormous market uncertainty in 1997 to 1998, combined with unk unks created by the Internet turbulence around 2000, as well as by the erratic behavior of the telecom operators when it came to UMTS licenses. If it had had time and cash, Option could have followed a learning strategy. But it had neither. It had no choice other than to continue with its original business model of selling computer peripherals under its own brand, to generate immediate sales. In addition, it experimented with OEM relationships and pushed this even to being a telecommunications R&D subcontractor.

Not all these experiments were launched at the same time, but they were seen as true alternatives, not as "competing" but as feasible options that needed to be explored in order to make an informed choice. At all times, the knowledge gained from one experiment was immediately applied to the other experiments. What was learned from the FirstFone in the market was applied to the partnerships with the operators. What was developed in terms of insights by working with terminal manufacturers was shared back into the projects with telecom operators.

Collaboration with telecom operators has now emerged as Option's superior business model. Each of the multiple selectionist experiments was partially successful, and through good communication among the various teams, a robust business model was developed. As we write this book (in the fall of 2005), the company seems to be fully committed to the further development of its partnerships with a wide range of operators. At the end of 2004 and the beginning of 2005, there was almost one announcement per week of a partnership with an operator.

The process of identifying the best business model was anything but smooth. A cursory analysis of the annual reports and press releases of the last five years immediately dispels any illusion of straight "progress." The company went through rough times financially, and press releases over the period 1999 to 2002 show repeated reorganizations of sales and marketing (directors and salespeople were hired and fired), of the development capacity (a laboratory was acquired in the UK and Germany, but the one in the UK was fairly rapidly reduced and then closed down), and of operations (production was outsourced to Jabil, a well-known contract manufacturer).

6.2 Explaining the Principles of Selectionism

The idea of trying multiple solutions in the same way as sending multiple search parties into the unknown jungle in order to choose the best attainable solution among them afterward is captured in the image of a rugged landscape. This refers to a solution "space" of design parameters with performance peaks and valleys. A peak corresponds to a project parameter constellation that yields high performance. The problem is to find a "good" peak of sufficient performance. In complex problems, there are many good solutions (and even more bad ones), and optimization is not possible; one cannot hope to find the "best" performance through analysis and incremental search. "Good enough" is what counts. Figure 6.1 shows parallel search parties sent into the mountainous terrain of a parameter space to find a good peak.[4] We will further develop the performance landscape metaphor in Chapter 7.

Thus, selectionism combines an overarching goal with the individual ambition of each search party. This clarifies the challenge: It is about balancing individual rewards (to get the teams to try hard and take personal risks in order to succeed) with a group objective to find the best possible solution for the organization. What matters is that the bomb in the jungle is eventually retrieved, not by whom. If the groups overemphasize the personal targets, they will not collaborate, or support one another, or share information (they may even hide information), and they will thus put the overall mission in jeopardy. But if they do not feel that they will be rewarded for success, they may not give their best.

This has important implications for the management systems used to lead the project (what we call "project infrastructure" in Chapter 9). The success of the individual project is subordinate to the success of the overall mission. Indeed, management wants to stop an individual trial when it becomes clear that a different project is doing better. From our example, as soon as there are indications that one or several of the teams have got close to the location where the plane crash-landed, you do not want to expose the other teams to the dangers of an unknown terrain.

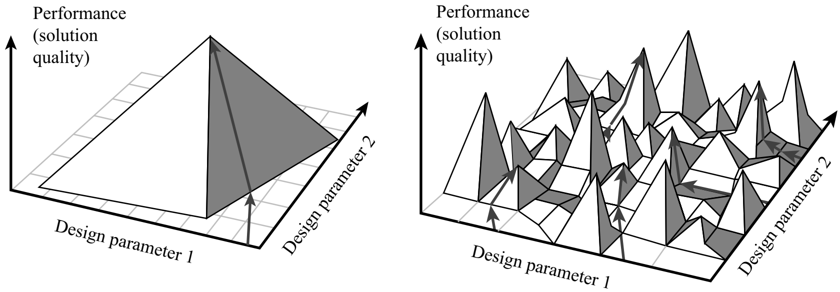

Figure 6.1 Selectionist searches in configuration parameter space

However, the people on the stopped project should not be punished if their project stops and a different one succeeds—it is the nature of the ambiguous and complex overall task that it was not foreseeable who would find the prize. All teams are necessary and make a contribution. Information must be shared, and all teams must share in the success of the overall project. We will further discuss these questions of project infrastructure in Chapter 9.

The treasure hunt example is obviously simplistic and artificial. But as we have seen at Option International, companies follow similar approaches when confronted with complexity, or unk unks. They often do so reluctantly; it is not easy to juggle several different (sub) projects with the same or a similar goal.

One study of 56 new business development projects suggests that one key difference between firms that are able to adapt to a changing environment and those that fail to do so lies in their ability to engage in selectionism,[5] creating a variety of different solution approaches. Pursuing improvement of the solution that one has may lead into a competence trap by settling on a solution that is subsequently shown to be inferior. As the rate of environmental change accelerates, in other words, as the degree of unk unks increases, selectionism increases in importance and produces better solutions than "continuous improvement." This is consistent with findings in systems engineering methods: The more complex a system is, the less the engineering team is able to find a "best solution," and the more important it becomes to try multiple different starting solutions to have one of them lead to a "good" solution.[6]

Dorothy Leonard-Barton (1995) describes a version of selectionism that she calls "Darwinian selection." This refers to experimenting with multiple models in the market, simultaneously. For instance, Sharp Corporation introduced several PDAs in 1993 to 1994. One was based on a proprietary operating system, sold in Japan as part of the Zaurus product line. Second, Sharp licensed Apple's Newton architecture to produce Expert Pad, as a direct competitor to Apple. Third, Sharp introduced a PDA based on GEOS from GeoWorks. In addition, it had plans to launch products based on Microsoft's WinPad and any other operating system with a chance of ultimately dominating the market. Products that don't do well in the market are mercilessly culled.

Such Darwinian selection seems to be more popular with Japanese companies, compared to the United States, where companies are less comfortable with this throw-it-against-the-wall-and-see-what-sticks attitude. Several hundred brands of soft drinks are brought out annually in Japan, most of which fail within a year. As one puzzled Western executive said, "These guys must be throwing money away; I've never seen such an unsuccessful bunch of marketers." However, until the early 1990s, Japanese consumer goods manufacturers were able to use this approach to severely curtail the success of Western companies. Although many trials failed, they offered learning lessons, and the successes opened new market niches so quickly that the targeted marketers had a hard time to react quickly enough.[7] Still, Darwinian selectionism is very costly, especially when the resource mobilization to pursue each one of the independent trials is high. Indeed, many Japanese companies seem to have pulled back from Darwinian selectionism in the mid-1990s.[8]

Generating variety needs to be balanced by ex post selection in order to be productive. In the case of Sharp's PDAs, the selection was indeed Darwinian, which means that the end customer market selected the fittest product. This is an expensive approach, as the market launch is the most expensive phase of any product development project. Therefore, many firms try to generate variations at the prototype level and narrow them down to a final solution before market launch.

For example, Toyota builds many prototypes of a new car, broadly considering sets of possible solutions to a design challenge and gradually narrowing the set of possibilities to converge on a final solution.[9] From the start, there is a wide set of possibilities, a wide net as they call it, followed by a gradual elimination of weaker solutions, based on additional information emerging from development, testing, customer input, and the achievements of other sets. As car designs converge, the different participants commit to staying within the set(s). According to Toyota, this form of selectionism, combined with a gradual refining of the space of sets, makes finding the best solution more likely. It takes more time, early on, to define the space of solution sets, but once the different trials have been determined, Toyota seems to be able to move more quickly to convergence and to production, than by using more traditional forms of concurrent engineering.

Implementing this set-based approach is not a simple management task. It requires the presence of a strong chief engineer who acts as system architect and oversees the process of narrowing down. This ensures three conditions of success:[10]

1. The development of the acceptable set space—that is, the definition of the constraints and criteria that characterize acceptable sets. An important part of this exercise is the constant communication about sets of ideas and regions of the design space, not about one idea at a time.
2. Integration of achievements from the sets that are developed in parallel by looking for intersections of feasible sets. In this integration exercise, it is extremely important to look for robust solutions—that is, solutions that can be successfully applied under many different combinations of constraints.
3. Confirmation that solutions are feasible before committing to them.

It is striking that in the description of the methods used by Toyota, it is explicitly mentioned that while in normal project management " . . . design processes [are viewed] as networks of tasks and [are controlled] by timing information handoffs between the tasks, as in the familiar PERT chart, Toyota views its process as a continuous flow, with information exchanged as needed." This stresses the need for a fundamental characteristic for selectionism. Selectionism is not a war among competing project teams that do not communicate or share knowledge with one another. Rather, it is the organization of multiple teams that constantly communicate with one another, share learning, and enrich one another.

6.3 What Makes Selectionism Work?

The comparison of the case examples above enables us to highlight some of the principles of selectionism. One can classify them in the following five (not fully independent) categories formulated as questions:

- In what space are we going to form alternatives? What is the set space of feasible and practical solutions?
- How many options, sets, or experiments can one afford to carry out simultaneously?
- When do we stop options or projects?
- How does one ensure that the selection indeed happens, and how does one create the commitment to the selected outcome?
- Key to the success of selectionism is the ability to integrate learning across the projects. How does one leverage the learning or other benefits from the nonselected experiments?

6.3.1 In What Space Are Alternatives Developed?

Selectionism is about creating variety and learning from it. However, the variety must not be unlimited. The options we want to pursue must fall within a feasible and practical space.

For example, on the subject of its set-based concurrent engineering, Toyota clearly states that success depends on carefully determining the set space. At the outset of the project, they strongly emphasize a correct definition of the design space, within which the sets have to fall. "Map the design space" is how Toyota characterizes the set of alternatives used in its convergence process. Functional departments within its development system simultaneously define feasible regions from their perspective. Each department, such as body engineering, chassis engineering, or production engineering, determines, in parallel, the primary design constraints on the system based on past experience, analysis, experimentation, and testing, as well as on outside information. These design constraints are translated into engineering checklists, which are used throughout the project to filter possible trials or sets.[11]

Option International, too, was tightly restricted in the selectionist trials that it could consider. Remember that its search for a new business model coincided with the heyday of the Internet boom. The temptation to opt for independent distribution of PC cards over the Internet may have been great, but it did not fit the observation that data communication cards also required close collaboration with mobile phone operators or terminal producers. Its variety space was also limited by its technology and the industry environment in which it operated.

6.3.2 How Many Parallel Trials?

The answer to this question is influenced by at least four drivers: (1) What is the cost of one trial or experiment; (2) how soon can one decide to stop a trial, (3) what is the degree of uncertainty, or unk unks, and complexity one needs to overcome, and (4) how strong is the managerial capacity of the organization to live with the ambiguity of the existence of parallel projects.

The more complex the problem (or subproject), the more trials are required in order to ensure finding a good solution. We will discuss this effect in more detail in the next chapter. But as was suggested by Leonard-Barton, in her description of Darwinian selection, the amount of resources needed to launch an experiment compared to the overall amount of resources the firm has available will obviously determine the number of experiments one can carry out. In the case of Option International, it was clear that the company could only pursue a limited number of development projects, given the size of its development department. Since each partnership or market approach required independent development, the company could only handle a limited number of contracts and market experiments. Even a giant like Toyota, while perhaps experimenting more than its competitors, is constrained by the number of sets it wants to, or can, coevolve.

Costs are not limited to resource commitments only. When the selection is visible to the outside world, such as in the case of Sharp or Sony, who both launched several versions of a product in order to figure out which one would get the best market response, there is potentially an important implication for the image of the company. If there are too many failures in the market, this may have a negative impact on the image of the organization. This effect is, to some extent, dependent on the tradition in the market. It is perhaps for this reason that selectionism is more often used by Japanese companies than by U.S. companies (see the discussion in Section 6.1). Traditionally, Japanese consumers have accepted that companies launch products in order to test their attractiveness. This acceptance level may be lower in the United States or Europe.

In the same way, a stock-market-listed company cannot be too daring in the array of business models it tries out. It needs to be firm in its communication with the financial markets.[12] Otherwise, its image (and stock price) will suffer.

Costs can be limited by restricting the duration or depth of the experiments. The earlier one can stop a trial that leads to a cul-de-sac, the better. The key to success is to make the impact of failing trials as small as possible. One can limit costs by stopping trials once one has a good idea that they are bounded by other alternative trials under way. We will come back to this in the next section.

The number of experiments is also dependent on the nature of the unk unk. There is a large literature in the field of combinatorial optimization that shows that the more complex a problem, the more parallel trials should be run. Thus, the more complex the problem, the more worthwhile it is to pay the cost of selectionism.[13] Higher uncertainty may also make selectionism attractive: If the team does not know the project terrain, it may choose to try several different solutions in parallel, hoping that one of them is appropriate for the environment that has emerged when the project is finished. Venture capitalists often view their investments this way.[14]

Finally, the number of experiments, perhaps even the capacity to apply selectionism at all, is influenced by the capacity of the project organization to live with multiple subprojects, of which several will be disbanded. As in the treasure hunt example from the beginning of this chapter, the organization wants to motivate the individual teams sufficiently so that they perform at their best, but it does not want to demotivate them when they are not "the lucky one" that finds the treasure.

The organization also needs a manager who can oversee a multitude of parallel projects. Not every manager has the skill of juggling many balls at the same time. In some cases, that person is called the program manager. In the case of a small company like Option, the role needs to be fulfilled by a person who is high up in the hierarchy. In this particular case, it was the founder and CEO himself who took it on his shoulders to carry through the project of the business model redefinition. In the case of Toyota, it was the chief engineer, the most senior technical decision maker on the team, who took on the role of system architect and lead designer of the vehicle. We will discuss the characteristics of this manager in more detail when we treat the project mind-set and the infrastructure in Chapters 8 and 9.

6.3.3 When to Stop Trials?

As we already mentioned in the previous section, the earlier one can stop a trial that leads to a cul-de-sac, the better. Costs strongly escalate over the course of a project, in many cases by a factor of 10 at each transition, from specifications to design, to development, to manufacturing launch, and finally to market launch.[15] While the cost escalation factor varies, obviously, from project to project, it is a good rule of thumb to bear in mind that the earlier one can stop a trial, the earlier one can select the appropriate course of action out of a number of experiments. As a result, the cost will be lower and the number of experiments that can be launched will be greater. The better one is able to organize the selection, the more variance one can create up front.

Selecting early on is highly dependent on the amount of communication among the different trial teams. If we go back to our artificial example of the teams searching for a nuclear device, it is clear that the faster one can recoup the information gathered by the different parties, the greater the chances are that one can narrow down the search area, and even take some teams off the operation.

In the case of Option International, there was always excellent communication among the different teams, in the sense that the CEO was heavily involved in each of them and could use the information collected in one experiment to improve the actions in another. As in the case of the chief engineer at Toyota, this shows that a strong overall leader, who has a good overview of all trials and is in charge of the process of convergence, is a second essential contribution to achieve selection early.

6.3.4 Ensuring Selection and Commitment to the Chosen Trial

Selection of the trials is essential. One of the biggest risks of selectionism is not to reach closure. Procrastination is the Achilles' heel of selectionism. While we stated the case for an early weeding out of dominated trials, we do not call for early selection at all costs. Converging too early can be risky. There is an optimum between letting the parallel trials run as long as necessary to get the benefits and cutting out some of the trials in order to limit costs. At Toyota, management insists on broad exploration to avoid convergence that is too fast and constraining. At Option International, the CEO, who had a complete overview of the different projects, paced both the introduction of new experiments and the conclusion of existing ones.

For a good process to come to selection, at least two components have to be in place: (1) excellent communication regarding the achievements of each parallel trial and (2) consolidation of the robust results—that is, the results that hold across different trials.

First, trial teams need to communicate with regard to positive achievements as well as failures. Moreover, evaluation of these results needs to be done in a shared way. The leaders of the trial teams need to sit down together to evaluate where each trial stands. Once again, selectionism is not served by ferocious competition between the trial teams. Such competition would lead to information hiding, which would be detrimental to all parties involved.

Second, robust results are those that emerge from different trials and hold under a variety of conditions. Let us return to Option International. In every business model that was explored, it became clear that the biggest beneficiary of a widespread adoption of PC communication cards was the telecom operators, because it was the only way they could stimulate data communication over the GPRS and UMTS networks. This was a robust result that still left Option a choice as to how to leverage this interest. Another organization with a stronger market position may still have attempted partnerships in which it could preserve its brand identification.

The robust result, however, implies that partnerships with operators should be a component of any solution.

Having selected an outcome has little value if, afterward, some team members switch back to alternatives or previous trials. Regression can be as dangerous as procrastination for the effectiveness of selectionism. Once an outcome has been narrowed down or selected, the team members must stay within the narrowing funnel so that other team members can proceed with their work, knowing that convergence has taken place.

Commitment to the solution depends on the degree to which members of the not-selected teams feel ownership of the final outcome. This can be best managed by attempting to enrich the selected outcome with contributions from other groups. This often improves the solution (as more information and expertise has been poured in), and if team members recognize their contribution in the selected outcome, they may adhere to it, even though it is not their own.

6.3.5 Leveraging the Benefits of the Nonselected Outcomes

The fifth principle for selectionist trials is that one needs to avoid the loss of the benefits of the nonselected outcomes. Benefits always include increased know-how and learning. In addition, there may be spin-offs, or an infrastructure that was created to explore the option and that can be used for other projects. We have three suggestions on how to manage this process of leveraging: ensuring common ownership of the end goal across the trial teams, fostering knowledge diffusion throughout the organization, and providing the teams with the appropriate amount of autonomy.

Often, the benefits of selectionist projects are embedded in people. The tacit knowledge they built during the experiment is valuable. Leveraging this value in the organization requires these people to remain motivated and to be distributed over the organization after the project's end, such that their knowledge will have the highest impact. As we have discussed, this requires giving all team members the perception that they contributed to the chosen outcome, and that they have a stake in that outcome.

Distributing the knowledge requires careful career management, which ensures that people move into new positions based on their performance, their potential, and the degree to which their tacit knowledge can help the organization that they join. The first two elements (performance and potential) are obvious. The third one is rarely applied but is essential if one wants selectionism to be effective for the organization.

Let us now turn to the issue of autonomy.[16] It has two components: goal autonomy and supervision autonomy. Goal autonomy has to do with the way performance goals are set. At one extreme (high goal autonomy), managers may give a group complete latitude in terms of goals, focusing on possibilities and opportunities. At the other extreme, managers may be directive, defining very specific goals and outcome criteria. Supervision autonomy refers to the specification and supervision of operational activities. A project group will have higher supervision autonomy if it has greater local discretion, permitting greater heterogeneity in day-to-day activities.

In order to increase the learning effectiveness of selectionist trials, one needs to increase both goal and supervision autonomy. Greater supervision autonomy allows for innovation in problem solving and helps reduce the strain on the team's information-processing capacity. It also provides an inducement for individuals to exercise greater individual discretion, leading to greater motivation and commitment.

The need to grant more goal autonomy is perhaps less intuitive. Traditional project management argues that clarity and measurability in the project goals are key factors for success.[17] The value of clear authority structures and working relationships for a project is seldom questioned. Project management preaches that goal autonomy should be relatively low in order to be conducive to good performance. As we discussed in Chapters 3 and 5, unk unks make plans, and their targets, just stakes in the ground. Thus, goal flexibility is valuable, both for the selectionist approach and for the learning approach.

6.4 Conclusion

In Chapter 3, we introduced two alternatives (learning and selectionism) to traditional PRM. In this chapter, we described and illustrated the selectionist approach. It consists of generating enough variations at the outset of the program in order to yield some desirable results ex post. It is not about creating a set of parallel projects that compete with one another to prove one another wrong. Selectionism is about creating variety and learning from it.

While it is a desirable goal, avoiding the negative effects of potential competition is not easy. Selectionism is quite difficult to manage. Summarizing our discussion, three principles stand out. First, the role of the program manager, the chief engineer, or the senior VP who oversees the set of projects is very important. Second, preserving open communication among the parallel trial teams is a condition for success. Motivating the members of the nonselected teams by giving them a stake in the final outcome is a third condition. We will look at all these elements from a different perspective in Chapters 8, 9, and 10 when we discuss the implementation of projects plagued with unk unks. But before discussing implementation, we need to see how to choose between the learning approach on the one hand and selectionism on the other. That is the topic of the next chapter.

Endnotes

1. More information can be found on the company's Web site, www.option.com. More details about some of the items mentioned in this case study can be found in the company's press releases or its annual reports.
2. Type approval is essential in the telecommunications world, where compatibility with the operators' networks is a necessary condition in order to be able to sell products. Without such approval, it is almost impossible to get access to the telecommunications networks.
3. There were other OEM contracts of a similar nature, but none of the same size as those with Handspring and Compaq. We keep them out of the story for simplicity.
4. The metaphor of a rugged landscape was popularized by Stuart Kauffman (1993) in the context of biological organisms performing well in the space of the genetic code. Rugged landscapes have also been used in project management literature (see, for example, Sommer and Loch 2004) and strategy literature (see, for example, Beinhocker 1999).
5. See McGrath 2001. She refers to selectionism as "exploration," or the generation of a variety of approaches.
6. As examples of systems engineering and numerical optimization, see, for example, Fox 1993 or Sobiezczansky-Sobiesky et al. 1998.
7. See the discussion in Jones and Ohbora 1990. They called Darwinian selection "product churning." The quote of the Western executive is on p. 21.
8. See, for example, Stalk and Webber 1993.
9. See Sobek et al. 1999.
10. See Sobek et al. 1999.
11. See Sobek et al. 1999.
12. The reports by financial analysts on Option, as well as its stock price are an illustration of this. During the period of experimentation, analysts were requiring more unambiguous information, and the stock price hit rock bottom. Since the period of experimentation, the realized revenues have been in line with announcements, and the stock price has increased by an order of magnitude.
13. For an example from numerical optimization literature, see Fox 1993.
14. See Sahlman 2000.
15. This has been shown empirically many times in new product development projects, for example, Soderberg 1989, or Terwiesch, Loch, and De Meyer 2002.
16. See McGrath 2001.
17. See, for example, Boddy 2002, Chapter 5.