CHAPTER 1: CORE CAPABILITIES

“Core” capabilities constitute a competitive advantage for a firm; they have been built up over time and cannot be easily imitated. Pg 4.

To create and maintain core technological capabilities, managers need at least two abilities: they must (1) know how to manage the activities that create knowledge and (2) possess an understanding of exactly what constitutes a core capability – what are its dimensions. There is a continuous interaction between the activities that managers encourage and the core capabilities of the firm. Pg 4.

Four dimensions of a core capability – physical systems, skills, managerial systems, and values. Pg 5.

As management scholars have pointed out, “espoused theory” tells us little about real behavior; we need to study “theory in practice” – i.e., view the actions that reflect managerial attitudes and values. Pg 5.

The clarity of the goal enables managers and operators alike to concentrate their attention on those activities that add obvious value. Activities – not goals or financial rewards or even skills (until they are activated) – create a firm’s capabilities. Pg 8.

Knowledge building for an organization occurs by combining people’s distinct individualities with a particular set of activities. It is this combination that enables innovation, and it is this combination that managers manage. Pg 8.

At Chaparral [steel company used as a case study in “Wellspring of Knowledge”] four primary learning activities create and control the knowledge necessary for its current and future operations. Three of these activities are internally focused:

(1) shared, creative problem solving (to produce current products);
(2) implementing and integrating new methodologies and tools (to enhance internal operations); and (3) formal and informal experimentation (to build capabilities for the future).

The final activity is externally focused: (4) pulling on expertise from outside. Pg 8.

That’s why we don’t have suggestion boxes, where you hide ideas so someone else won’t steal them. Pg 12. (culture vs. process – the suggestion box is the process)

By the time you hear about a technology in a paper at a conference, it is too late. Pg 13.

It [Chaparral] also invests heavily in an unusual formal apprenticeship program for everyone in the plant… “Expertise must be in the hands of the people that make the product”. Pg 14.

Chaparral also invests in people through informal practices such as “vicing”. Pg 14.

Core competencies provide a gateway to new opportunities. Continuous innovation is an act of “creative destruction”. Even “seemingly minor” innovations that alter the architecture of a product can undermine the usefulness of deeply embedded knowledge. Pg 17.

The test of a useful description of a core capability is the extent to which it can be meaningfully operationalized. That is why this book emphasizes the design of activities that create and channel knowledge rather than the process of agreeing upon a phrase or statement that captures a company’s technological identity. Pg 18.
Supplemental capabilities, as the name implies, are nice to have — but unessential. Enabling technological capabilities are those that are important to a company as a minimum basis for competition in the industry but that, by themselves, convey no particular competitive advantage. Core technological capabilities, by contrast, are those that set the company apart from the rest of the pack and at least potentially provide a competitive edge. Pg 18.

Core capabilities compromise at least four interdependent dimensions, two of which may be thought of as dynamic knowledge reservoirs, or competencies, and two of which are knowledge-control or channeling mechanisms.

1. Employee knowledge and skill: this dimension is the most obvious one.

2. Physical technical systems: But technological competence accumulates not only in the heads of people; it also accumulates in the physical systems that they build over time — databases, machinery, and software programs.

3. Managerial systems: the accumulation of employee knowledge is guided and monitored by the company’s systems of education, rewards, and incentives. These managerial systems — particularly incentive structures — create the channels through which knowledge is accessed and flows; they also set up barrier undesired knowledge-creation activities.

4. Values and norms: these determine what kind of knowledge are sought and nurtured, what kinds of knowledge-building activities are tolerated and encouraged. There are systems of caste and status, rituals of behavior, and passionate beliefs associated with various kinds of technological knowledge that are as rigid and complex as those associated with religion. Therefore, values serve as knowledge-screening and — control mechanisms.

There are at least three kinds of skills and knowledge constituting this dimension of a core capability: (1) scientific (public), (2) industry-specific, and (3) firm specific. Moving from 1 to 3, these types of skills and knowledge are increasingly less codified and transferable. Pg 21.

The tacit knowledge of various experts that accumulates in firms, structured and codified over time, becomes embedded in software, hardware, and accepted procedures. Pg 22.

Moreover, like a coral bed in the ocean, physical systems preserve the knowledge of individuals who have moved on the other functions, other jobs, other organizations. Pg 22.

Skills and knowledge, both embodied in people and embedded in physical systems as well as managerial systems all exhibit a particular character depending on what is valued in the company. In most companies, the basic assumptions about human nature and the personal values of the founders led to the growth of a set of corporate values. Pg 24.

When Chairman and CEO James Burke feared that the Credo was becoming mere formula, he and J&J President David Clare traveled to all 150 J&J companies to “challenge” the Credo. Pg 25.

CHAPTER 2: CORE RIGITIES

When the system itself matures into mindless routine, managers find themselves fighting the very underpinnings of the firm’s success. Pg 30.

A former senior executive at Sears recalled that inattention to outside events was compounded by the existence of a whole library of “bulletins” dictating responses to problems. “God forbid there should be a problem that comes up for which there isn’t a bulletin,” he observed. “That means the problem’s new!” Pg 31.

Once a system is set up to deliver a certain capability, that system acquires a momentum of its own and becomes difficult to dismantle. Pg 34.
One of the simplest explanations for a rigid adherence to prior approaches for solving problems is that alternatives don’t occur to employees. People have a natural selection bias toward the familiar in designing new products. Pg 37.

[a competency trap] can occur when favorable performance with an inferior procedure leads an organization to accumulate more experience with it, thus keeping experience with a superior procedure inadequate to make it rewarding to use. Pg 39.

A primary result [of core rigidities] is the inability of companies to integrate knowledge across specialties. Pg 49.

As explained in Chapter 1, there are really two kinds of values – generic (or big V) and knowledge –base-specific (or little v). pg 51.

One of the difficulties of changing corporate norms and routines is that employees confuse the two different levels of values and are uncertain as to whether they are being asked to alter a big V or whether the change involves only the way in which existing values are being operationalized. That is, are basic values regarding the mission of the company being altered – or only the way the activities in support of that mission are being carried out? Pg 52.

CHAPTER 2: CORE RIGITIES

This chapter examines three sources of individual differences in problem solving – specialization, preferred cognitive style, and preferences in tools and methodologies. Pg 61

Even slight prior experience with an object negatively affected people’s ability to think creatively about its use. Pg 61

These blocks [people process information in blocks not as a steady stream] constitute mental models, or schema [see Simulating Science by Gorman], against which we calibrate information and that we use to solve problems. Pg 62

Mind-sets, therefore, are highly useful in routine activities. In fact, if the technique toward which prior experience biases us provides the best solution to a particular problem, applying that solution is both efficient and effective. In an organization, when such techniques are reinforced over time by success, the patterns of thought fall into well worn grooves and become part of business capability. The problem is that, as we have already seen, the limited range of problem solving responses developed can become dysfunctional and contribute to core rigidities. Pg 62

A signature skill is an ability by which a person prefers to identify himself or herself professionally. Signature evokes the idiosyncratic nature of the skill – a personally defining characteristic, as much a part of someone’s identity as the way the individual signs his or her name. pg 62

A signature skill is an outgrowth, an interactive expression, of three interdependent preferences – preferred type of task, preferred cognitive approach to problems (sometimes considered cognitive style), and preferred technology for performing the task. Pg 62.

Creative Abrasion (three types) pg 63. Director of Nissan Design International coined the term creative abrasion to emphasize that energy generated by the conflict can be channeled into creating rather than destroying, into synthesis rather than fragmentation. (pg 63). Some managers of innovative organizations select people because their ideas, biases, personalities, values, and skills conflict – not in spite of the differences. [this is inline with Gorman’s invisible colleges]. (pg 63).

Innovation occurs at the boundaries between mindsets, not within the provincial territory of one knowledge or skills base. Pg 64.
1. Specialization: Specialization leads to expertise, of course, and therefore the availability of deep knowledge to apply to problems. However, the resulting distance “thought worlds” rarely intersect, unless purposely driven to do so [cross functional teams]. (pg 65)

As these examples illustrate, specialization provides the deep reservoirs of knowledge necessary to solve extremely complex problems in new-product and new process development, as long as the specialties can communicate with each other. Pg 69-70.

2. Cognitive Style Preferences: pg 70.

3. Preferences in Tools and Methodologies:
   Perhaps the greater danger in trying to develop T-shaped skills in most companies, however, is that the press of urgent daily tasks will lead managers to pull the nearest available competent individual into a project, with little to the implications of that assignment for developing T-shaped skills [goes with my thoughts and writings on finding the right, best person for each job]. pg 77.

Groups that gloss over differences, applying patina of accord and seeking superficial peace, are not likely to be creative. Yet, disagreements have to be impersonalized or emotions will also interfere with creativity and leave bitterness in their wake. Pg 78.

Within some innovation cultures, prototypes effectively become the media franca of the organization – the essential medium of information, interaction, integration and collaboration. When prototypes are used for only testing technical concepts and not as communication vehicles for problem solving across boundaries, developers are overlooking enormous opportunities for creative abrasion and integration [in line with using requirements as collaborative and communication tools]. Moreover, because prototypes are physical or visual objects, they can communicate with people who have no special training by whose untutored eye may predict general public response much better than the judgment of the “experts”. Pg 84.

A Clear Destination: A manager’s most powerful ally in focusing creative energies is a very clear project destination [in line with the view on the importance of requirements]. Pg 86.

Every new-product development project potentially has two, interdependent, destinations: the product itself and an improved new-product development process – product concept and project guiding vision. Pg 86.

1. Product Concept: a formally agreed upon product concept “defines the character of the product from a customer’s perspective”. [in line with ‘use case scenarios’ from Rqts Eng]. Pg 86.

   Democracy without clear concept leadership is the archenemy of distinctive products. Pg 86.

2. Project Guiding Vision: This vision defines the output of the team in terms of both the product and what the project is adding to the knowledge base of the firm. In other words, a project guiding vision places the particular effort in relation to clear business purpose (e.g., launching a certain product line – and to the critical capabilities the corporation is building. Thus, project team members know that immediate business purpose they serve and the streams of knowledge to which they are supposed to contribute. Pg 87.
The single biggest underlying cause for the demise of this [or any other potential implementation] initially promising innovation was the quite understandable but simplistic assumption that physical installation was the sole project objective and criterion for success…implementation is not usually managed as if it were an exercise in innovation, and that is the key point in this chapter. Pg 92.

User Involvement: Two generic reasons are typically cited for involving users in the development of a new technical system: pg 93-94.

1. implementation implies some level of change in the users’ work, and research on change suggests that people are more receptive when they have contributed to its design (Creating “Buy-In” pg 94).

2. involving users in the design of their tools results in superior designs since users have specialized knowledge about the environment in which the tools will be utilized, and that knowledge should be embodied in the design (Embodying Knowledge pg 94).

Embodying Knowledge: Developers rarely possess all that knowledge themselves but must interact with users to create or capture and structure and then embody the requisite knowledge. Pg 94.

1. User selection: Is it more important that users be expert in the task to be aided, so they can provide critical comments on the functionality of the tool – OR – that they typify the user population in their ability to manipulate the user interface ??? As the following examples [found in text not in notes] suggest, the two different kinds of knowledge do not always come in the same human package. Pg 95.

2. Representativeness: if the new technological systems will be distributed to multiple offices or factories throughout the corporation, then the choice of the user site to help develop and test prototypes becomes crucial…[there are] significant hazards associated with the unwitting selection of an atypical user [or user site] to guide design. Pg 96.

3. User Willingness: Willing users may not be representative, of course, and representative users may not be willing. Doll and Torkzadeh found that users who were involved more than they desired in the development of a system were less satisfied with the end result than were users involved less than or just about as much as desired. Pg 96.

Models of User Involvement: (four types) pg 97


2. Consultancy Mode: periodic consulting with users about features and functions provide the opportunity for feedback and user input. The most successful “consultancy” projects were very large, highly structured endeavors in which user groups were treated like customers with diverse needs and a right to influence, but not totally direct, development. Pg 100.

3. Codevelopment: Users are part of the development team.

There is a tendency for users to be fixated on what they’re using today instead of thinking about features they’ll need in three years. Users can lead the development team into automating history. Pg 100.
On the other hand, hen users are innovative and can envision where their organization should be headed, codevelopment projects may succeed beyond the expectations of either the users or the developers. Pg 101.

4. Apprenticeship Mode: Users wanting their own capabilities and independence from developers employed this apprenticeship mode. Developers had to be willing to play the role of tutors rather than providers and users had to be willing to invest enough time and resources both to become expert in the underlying technology and to implement all the needed changes when they returned to their home territory.

Codevelopment, in short, had much more effect on the organization’s learning process then the other modes. Pg 103.

Mutual adaptation is the reinvention of the technology to conform to the work environment and the simultaneous adaptation of the organization to use the new technical system. Pg 104.

A significant challenge managers face is detecting when a large spiral is masquerading as a small one; that is, when a series of small adaptive spirals is inadequate to create or support an important technological capability and a large spiral of change is required – in either the technical system, the work environment, or both. In such cases the manager is thrust into the role of revolutionary organizational redesigner. Pg 105.

To combat experimentation burnout, managers need to slow the outflow and replenish the bank. They can: (1) pace the changes insofar as possible and (2) celebrate small successes and milestones along the way. Pg 109.

User involvement must be carefully managed, as extracting knowledge from atypical, disinterested, or very near-term-oriented users can damage rather than enhance the design of a new process tool. Pg 110.
CHAPTER 5: EXPERIMENTING AND PROTOTYPING

Detailed strategic plans can be outdated by the time they are approved, rendering them useless as guidance and perhaps even dangerous. Pg 112.

Recognizing that clever, technologically talented employees could create whole new businesses for the corporations, starting with an experimental project to develop a particular product or process, such leaders tried to foster an atmosphere in which a thousand flowers could bloom – at least initially. [loose requirements] Pg 116.

An idea become reality when espoused by someone unafraid to turn heretic against predominate technology or company culture [in line with my writing on personality vs. process leadership]. Pg 117.

The ultimate objective of [managerial actions that make the difference in how much people are willing to experiment] is to be able to weave a certain amount of experimentation into the fabric of the organization as a whole rather than isolate it into a research function. The more uncertain the future, the more essential becomes an environment in which everyone in the company is primed for experimentation and learning and in which prototyping is not a specialized, technical activity related to the engineers but a way of thinking. [To create such a climate]: (1) separate intelligent failure from unnecessary failure, in both language and managerial response, and (2) to recognize the role of failure in building knowledge. Pg 118.

Organizations are adept at ignoring negative news…identified four sources of “learning disabilities”: (1) impression management through overly optimistic presentations, (2) setbacks not detected as errors that could provide learning, (3) proliferation of interdependent activities that distract from a real evaluation of the core idea; and (4) transitory project membership, leading to organizational forgetting. Pg 118.

In most organizations, because previous projects were “unsuccessful,” they became invisible, and managers delude both themselves and others about the debt owed to failures. Pg 120-121.

With hindsight, it could have been argued that some of this experimental thrashing around should have been avoidable, in practice, some kinds of learning are heavily experimental. Pg 121.

The purpose of the pilot [implementation] experiments was narrowly [and wrongly] interpreted as providing feedback about the software features [in this example] to its designers – not providing feedback to the corporation about the interaction between the software and the way it was implemented. Pg 123.

Many people, however, seem unable to tolerate incompleteness, to fill in missing details, to see the potential in the prototype – and they are the bane of designer’s lives. They will take every presentation of line, shape, and color as absolute and final. Consequently, designers soon learn that some clients cannot be shown preliminary ideas at all. Pg 124.

Managers who believe that they could not spare the resources to prototype actually spent much more time and money cleaning up the mess incurred by the haste, the confusion, and the anger. Pg 129.

If the action-outcome-feedback links are short and frequent, the individual is in a good position to learn about, and thus comprehend, the probable effects of actions on outcomes: short links enhance the ability to improve decision making by taking corrective actions. The opposite is true. Pg 131.

One mechanism designed to derive learning from projects is a postproject audit [hotwash, after action report, etc.] i.e., team-conducted reviews at the end of developmental projects for the explicit purpose of identifying what could be done better next time. Managers in many companies say that such audits are conducted. However, there are three crucial questions that ascertain the actual usefulness of such audits:

(1) Who conducted them? If a few of the team members have moved on to other development assignments and therefore not all team members are present, the audit is incomplete.

(2) How inclusive of all projects are the audits? Have all the projects (including ones that did not result in marketable projects) been audited? Although auditing even a single project is extremely useful, patterns of
chronic problems show up across projects, for different types of projects. Multiple project audits are a valuable tool for uncovering core rigidities.

(3) What happened to the information gathered? Most managers can answer this question confidently: someone wrote up a report. If one inquires, What happened to this report? Or What changed on the next project? The response is usually a sheepish admission that the report is securely buried in a filing cabinet somewhere.
CHAPTER 6: IMPORTING AND ABSORBING TECHNOLOGICAL KNOWLEDGE FROM OUTSIDE OF THE FIRM

The ability of a firm to recognize the value of new, external information, assimilate it, and apply it to commercial ends is critical to its innovation capabilities. Pg 136.

Knowledge benefits flow along such [meaning connecting two or more organizations] unequally, depending not only on the sagacity of the technology source, but even more important, on the absorptive capacity of the recipient. Pg 136.

As we will see in this chapter, firms differ considerably on their ability to develop outside wellsprings of knowledge – i.e., to identify, access, and assimilate knowledge from external sources. Pg 136.

Gomes-Casseres notes three types of alliances – learning, supply, and positioning. The later of the two are essentially “arm’s-length” agreements. Supply alliances are formed to minimize the transaction costs of trade and product exchanges. Positioning alliances are part of a marketing strategy, helping firms create or overcome market entry barriers. Both supply and positioning alliances may allow knowledge spillover but they are not motivated by an effort to integrate capabilities. Learning alliances, however, intend from the beginning to augment internal knowledge. Pg 136.

Create Porous Boundaries: Managers need to expose their companies to a bombardment of new ideas from outside in order to challenge core rigidities, encourage inventive serendipity, and check technological trajectories for vector and speed versus competitors. (five methods). Pg 155.

1. Scan Broadly: Although physical proximity does not ensure knowledge flow it certainly increases in probability. Pg 156-7.

2. Provide for Continuous Interaction: Allen found that low performers…spent most of their of their outside exploration time in two lumps – at the beginning and just after the midway point. In contrast, high performers kept up a consistent, continuous relationship with information sources of all types during the project. Such constant attention is difficult because it takes time…[but] is essential because competition or information sources may have made progress since last contact. Pg 157.

3. Nurture Technological Gatekeepers: Gatekeepers are outstanding technological performers who keep their colleagues apprised of the latest happenings in their field. Pg 157.

4. Nurture Boundary Spanners: Boundary Spanners are people who understand the world of the source and the world of the receiver and translate as well as disseminate knowledge. Researchers studying interfirm alliances have remarked that a weak liaison (young, inexperienced, or an outsider) is likely to doom the alliance. Pg 158.

Continuity among personnel is another factor greatly affecting the success of knowledge absorption; as noted above, a large portion of knowledge (and often the most valuable part) may be tacit – i.e., still in people’s head. Pg 158.

5. Fight Not-Invented-Here. Pg 159.

R&D, done without a specific objective, can waste resources by working on issues without reason. However, one must be ready to revise objectives as the situation changes. Research may show that the original objectives are not possible or that the tasks are easier than anticipated and the goals can be set higher. Pg 162.

MCC suffered from a problem typical of many types of alliances: the high-level managers who set up the original partnership were not responsible for making it actually work. Pg 162.
One of the greatest paradoxes in accessing external technology is that the more desirable it is from a competitive viewpoint, the less likely inherently transferable it is, and vice versa. Pg 165.

Managers have to make a tradeoff between desirability and transferability. Pg 165.

Merely transferring rule books might not capture the essence of managerial systems at all since [some] practices…are informal. Pg 165.

The tacit knowledge of people even quite far down the organizational ladder, and not explicitly recognized as experts, may be an essential part of the technological capability being captured. Pg 165.

Enacted values – the values and norms used to guide decisions and behavior – are more desirable than sterile lists of guidelines and decorative mottoes, which may be espoused (i.e., embraced in theory) but not followed. Pg 165, 167.

Consultants with no stake in the outcome of the decision can help since they may understand the technology very well. But unless they have had a long-term relationship with the firm, they are unlikely to understand whether and how a new technological import could be incorporated and absorbed. Pg 167.

Because knowledge if difficult to assess, we tend to equate role or title with know-how. That is, rather than consider the skills and knowledge needed, we tend to evaluate capability by checking off, say, the number of engineers. Pg 170.
CHAPTER 7: LEARNING FROM THE MARKET

A study of 252 product development projects in 123 firms discovered that preliminary market assessments were conducted in successful product development projects; however, formal market studies, done in only a quarter of the projects, were usually rated as “poorly handled”. Moreover, the studies tended to be reactive competitive comparisons in over a fourth of those projects. There were almost no concept tests – i.e., studies of customer reactions to proposed new product in concept form. Less than a fifth of the project teams studied what the customers actually wanted or needed, to generate product specifications. Finally, at least as much detailed market research was done for the failed projects as for the successful ones. It would appear that merely increasing emphasis on market research in itself does not lead to better understanding of user needs and a higher probability of product success. Pg 179.

Most companies are faced with a variety of new-product definition situations – each requiring a different range of information to be imported from the market. Figure 7-2 [below] suggests that two basic factors shape these situations – the maturity of the technological design underlying the product line and the customer base. Variance along these two dimensions determines the level and types of uncertainty that new product developers face and consequently the types of information needed. Pg 180.

![Alignment of Product Line with Current Customer Base](image)

Technology-based companies will always have to move to the right on this horizontal axis, seeking new customers and perhaps even new markets. Pg 183.

In his book, *Mobilizing Invisible Markets*, Hiroyuki Itami notes that there are three different kinds of customers, each contributing differently to a firm: 1) customers who generate profit, 2) customers who will generate sales growth, and 3) customers who allow the accumulation of invisible assets. Itami suggests that every company would wish to have a balanced mix of customers, so that the revenue generating ones may tide the company over financially while the other less profitable markets generate important knowledge for the future. Pg 183.
Market Research Techniques: (3 types)

I. Inquiry (pg 190)

I.A. Survey Groups: Despite the tremendous sophistication of such interviewing techniques, they can only uncover those needs and desires about which the informants are aware and can articulate. The relative ability of the users to guide product specification is greater when a product category already exists.  Pg 191.
I.B. Lead Users: Lead Users have two characteristics: 1) they face needs that will be general in the marketplace but they face them months or years before the bulk of that marketplace encounters them; and 2) they are positioned to benefit significantly by obtaining a solution to those needs. Pg 192.

Dialogue with lead users operates within one of the boundaries characteristic of the other techniques mentioned so far. At least the first generation of the product must already exist in the market – i.e., reference product must exist. Lead users must be users of the existing technology in a practical form with the current products in the market. They make their suggestions for improvements based on their experience with the current products on the market. Moreover, the needs of these lead users cannot be totally idiosyncratic but must be somewhat representative of future buyers. Pg 192.

I.C. Latent Needs Analysis: Some techniques are designed to probe users’ desires less directly and thereby uncover latent and less readily articulated needs: K-J analysis, Value Matrix, Zaltman Metaphor Elicitation Technique. Pg 192-193.

II. Empathetic Design: Often decried as a “technology push” when they result in unacceptable products (and as “lucky” when they succeed), these situations offer the greatest opportunity to exploit existing technological knowledge in novel ways. Products developed with new technologies for old markets and familiar customers (developer-driven, the application of moderately mature technologies to new or evolving customer sets (user-context development), and old technologies renewed through their embodiment in different products (new applications) – see figure 7-3

Empathetic design can be deployed to augment the development of product enhancements, but the major opportunities lie in those situations in which a technology can be shaped to meet unarticulated but observable needs. Pg 193.

Figure 7-5+7-6: Importing Knowledge from the Market: The greatest Opportunity for Empathetic Design. Pg 194, 196.
Empathetic design is the creation of product or service concepts based on a deep (empathetic) understanding of unarticulated needs. Pg 194.

There are three important characteristics that set empathetic design apart from other forms of market “research”: pg 194.

1. the product concept is based on actual observed customer behavior. Pg 194

2. empathetic design is usually conducted through direct interaction between those who have deep understanding of the firm’s technological capabilities (product developers such as engineers and designers) and the product users. Pg 195.

3. empathetic design tends to draw on existing technological capabilities that can be somewhat redirected or imaginatively deployed in the service of new products or markets. Pg 195.

II.A. Developer’s Market Intuition: pg 195
   II.A.1. User-Developers: pg 195
   II.A.2. Industry Experts: pg 197

II.B. Market Matching: companies leverage their core technological capabilities by identifying applications for which users have a need but for which they would be incapable of imagining a solution because they do not know the technological potential. [This is important for the ‘user organization’ to remember so that they advertise their needs to get input from industry experts who do know ‘technological potential’. See User-Developers]. pg 198.

   II.B.1. Technology Transfer: get knowledge from public domain, sharing knowledge across in departments within your organization, applying knowledge from one industry to another. Pg 198.

   II.B.2. Partnering with Customers: pg 199.

II.C. Anthropological Expeditions: developers immerse themselves in the user environment. Pg 200.

   II.C.2. Capturing Practice on Film (or Video): pg 202

Common to all the modes of empathetic design described above is an attempt to maintain an open mind about how unarticulated user needs can be met. Pg 203.

Once a concept has been identified [using empathetic design], potential customer feedback is important. That is, once empathetic design techniques have been identified possibilities that the users themselves would not have requested, more traditional techniques are employed to refine and test the concept. Pg 203.
III. Creating a New Market: pg 204

III.A. Extrapolation of Trends: pg 204

III.B. Scenarios of the Future: The intent of such scenarios is less to predict the future state exactly than to stimulate consideration of nonobvious futures, to force “out-of-the-box” thinking – to divorce thought from a straight, unwavering trend line. pg 205.

III.C. Market Experimentation: For short-lead-time items that can be quickly manufactured, many companies simply do not invest in crystal balls. [Instead, they test a fully functional product in the market place on a small scale.] Pg 205.

Recently, however, some companies have begun to perceive such limited testing as dangerous: competitors are afforded time to imitate and market feedback may be distorted. Pg 206.


III.C.3. Vicarious Experimentation: wait and let the pioneers get the arrows in their backs and learn from their mistakes. Pg 207.
This chapter addresses the question, How is the capability to develop new technology-based products transferred to a new site? Pg 216.

Success in transferring technological capabilities depends on, at a minimum, agreements between source and recipient about the level of development transfer to be achieved and also on both sides’ understanding of that goal’s managerial implications – i.e., the effort and resources necessary. Pg 223.

The more that managers understand the classes of problems that occur and develop the ability to anticipate issues through prearrangement diagnosis, the greater the likelihood of success. Pg 223.

Transferring technological capabilities requires an extremely important managerial skill not always associated with technically skilled people – the ability to coach. Good coaching requires an appreciation for how knowledge is conveyed: that knowledge is often tacit – held in the head – and cannot be transferred though blueprints or documentation; that lectures are not effective communication devices, that a lack of understanding apparently due to inadequate skills may in fact be caused by language difficulties, and vice versa. Pg 251.

Instructions and students alike can concentrate on operations as they function under home-country conditions at the technology source. However, conducting pilot operations in the developing country also offers the great advantage of organizational prototyping. For the purposes of creating local knowledge, local pilots are often preferable. Pg 252.
CHAPTER 9: CONTINUOUS WELLSPRINGS

And it is true that capabilities change more slowly than projects or management programs or product lines. Yet even capabilities must shift channels from time to time in response to other conditions. Research following the history of industries over generations has shown that there are always sharp discontinuities, often occasioned by new technologies and often competence destroying. Many firms founder, and few survive. Pg 269.

In the process of renewal, human minds are the most flexible assets a company has – and the most rigid. People are capable of making astonishing leaps in intuition and, at the same time, of tenaciously clinging to the details of petty, unproductive routines. That is why this book as devoted so much attention to behavior, even though the focus is on technological information passing and more upon all the activities and systems that create technical knowledge – and allow it to be creatively destroyed so as to adapt anew. Pg 260.

Developing core capabilities is more like growing a garden than like building a brick wall. Pg 264.

Managers who successfully develop core capabilities look for organizational metaroutines that will lead the company into the future. So, for instance, when they sign a travel voucher for an employee to visit a customer site, they think about the use of the knowledge thus engendered. How will it be leveraged beyond the use by one individual? What mechanisms exist to share that information? ... For every activity the manager asks, What is the potential knowledge-building import of this action? Pg 264-265.

Project audits can either be sterile and futile exercises or rich seminars on progress, depending on the manager’s attitude. Pg 265.
"Wellsprings of Knowledge" is very à la mode in raising this attitude to an institutional level. The author views companies as sites of learning and information transfer rather than as physical or financial entities. The workforce of a forward-looking company must be able to process and manipulate knowledge as well as perform particular skills. Top management must encourage creative chaos, cross-fertilization among disciplines within the company and benchmarking with competitors.