From Experience

Dreams to Market: Crafting a Culture of Innovation

Karen Anne Zien and Sheldon A. Buckler

Do certain common principles guide uncommonly innovative companies down the risk-riddled road to value creation? Or do successful innovators break boldly through the barriers to new product development along pathways of their own unique making? Karen Anne Zien and Sheldon Buckler discern a strikingly consistent model of how companies craft and sustain cultures in which innovation is nurtured, rewarded, even demanded.

An article by the authors in the September 1996 issue of JPIM recounts seminal tales from the cultures of innovation consciously nourished by 12 leading-edge corporations in the United States, Europe, and Japan. Gathered through an extensive series of interviews with key personnel in the management, technical, manufacturing, and marketing divisions of each firm, the stories revealed seven traits widely shared from one company to the next, irrespective of business focus, geography, or nationality. These traits, as discussed in this article, not only serve to reconcile the culturally contradictory demands of the three critical stages of innovation—the "fuzzy front end," the product development process, and marketplace operations—but also condition the company as a whole to sustain its innovative capacity over time.

The principles at work in highly innovative companies encompass corporate as well as individual attitudes and behaviors. On the one hand, company leaders demonstrate in every decision, action, and communication that innovation propels profitability. So, for the CD project at Sony, the R&D general manager heeded "a voice from above that does not question the possibilities and absolutely believes" in the potential of the enterprise.

On the other hand, actively helping individuals create a linkage between their "work life" and longer term "life work" is a crucial step in generating an environment where innovation and high productivity flourish together. Thus, a divisional chief executive at ICI/Imperial Chemicals Industries recognizes the need to "create an environment where people will work at what they are best at doing and what they like doing best."

Although the trail to successful innovation inevitably follows the unique contours of any company’s environment, some universal guideposts point the way.

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Introduction

In 1993, while at Polaroid, we were troubled by this critical question: How can a mature company keep its innovative spirit alive—or, if necessary, relight and revitalize it? To find the answer, we organized the Polaroid Invention and Innovation Research Project. Our cross-functional team videotaped more than 140 in-depth interviews with technical, marketing, and management personnel from 12 leading U.S., European, and Japanese companies—companies like Sony, Hewlett-Packard, Toshiba, Club Med, and Polaroid that have introduced a stream of financially successful new products founded on new business concepts and new inventions. The complete list of study companies is shown in Exhibit 1.

What we found was a strikingly consistent model of how companies craft and sustain a culture in which innovation is not only tolerated but nurtured, rewarded, and even demanded. We learned about mavericks and champions, corporate storytelling, the Fuzzy Front End—and most critical of all, the role of Top Management.

In an earlier article, we emphasized one aspect of how these companies invigorate and sustain an innovative culture: leaders at all levels of these highly successful, mature enterprises tell and retell compelling stories of innovative experiences and exploits [3]. These stories, myths, and legends are the organization’s teaching parables and are ubiquitous throughout highly successful enterprises.

One story we told in our earlier article was Marv Patterson’s of a moment in the development of Hewlett-Packard. In this story a leader’s spontaneous human reaction (Bill Hewlett’s direct response to an unwieldy pen plotter prototype) spurred a salient invention (Larry La Barre’s elegant microsprocket drive design), helped to change the nature of Hewlett-Packard’s business (to a major provider of diverse drafting plotters for a variety of key markets), and set the stage for the innovative printers and computers of the ’80s, now HP’s biggest business.

. . . The bottom line was that we made that decision back in 1978, the plotter was introduced in January of ’81, and by the end of 1982, we owned 60% of the marketplace that had grown 60% because of this product introduction. We literally revolutionized the drafting plotter marketplace at the time. In the next 4
or 5 years we dominated that marketplace. Absolutely dominated it. And by 1985, any plotter that was competitive used grit wheels. So to me that’s a story of innovation.1

In this article we will describe how these companies strive to keep their innovative spirit vibrant and robust by employing principles of innovation. In keeping with our cultural anthropological approach, we will rely once again on our interviewees’ narrative descriptions and on the patterns and themes that occurred across all the interviews. Exhibit 2 describes our method.

Seven Principles

Innovative companies, regardless of differences in industry and geographic culture, share a set of characteristics, qualities, and behaviors that differentiates them from other less innovative companies. In the course of our research, there emerged a remarkably consistent pattern, a well-crafted fabric, that has kept the innovative force strong and functional in the companies we studied, despite changes in leadership and direction, industry structure, the marketplace, and the passage of time. We, and our study companies, were completely surprised by this finding, since we had expected to see vastly different patterns in the form of regional models for Japan, Europe, and the U.S.2

We identified seven key principles at work in innovative companies across all these geographic regions. These are listed in Exhibit 3. The principles are a set. We found them all present throughout and woven together in these highly innovative companies. As far as we could determine, these companies had not learned them from each other or a common source. Rather, the principles arise spontaneously as a pattern in companies that continually hone a culture of innovation.

While the principles are universal, we found that each company’s implementation “formula” is particular and specific to that company. Each company customizes the principles for their own corporate culture by systematically and systemically implementing a set of practices or approaches throughout the whole enterprise. The innovative companies in our study take a few provocative approaches to these principles, hone them, work them fully into their enterprise, and repeatedly refresh and renew them by eagerly adding new approaches to sustain their innovative character.

“Innovation” is the whole spectrum of activities, from dreams to market introduction and maintenance, necessary to provide new value to customers and a satisfactory financial return to the company. Figure 1 is the conceptual model we developed as we interviewed.

Everyone in these companies is engaged in the dynamic creation and recreation of a culture of innovation. Innovative companies carefully craft and continually take new actions to sustain their innovative cultures. We found that innovation occurs throughout the whole system we call the enterprise, and there are three micro climates or micro cultures—the “Fuzzy Front End,” the Product Development Process, and Business Operations—as represented in our conceptual model. All three micro cultures are essential to the creation of new value. The apparent dilemma is that each of these micro cultures has characteristics and requirements that seemingly are incompatible with the others, as we have indicated in Table 1. In the innovative companies we studied, senior leadership develops and sustains a context that simultaneously fortifies all three micro cultures and includes strong, vital feedback loops and connections among them.

Managing the paradox represented by these three micro cultures is what we mean when we say innovative and transformational leaders create the context and craft a culture for continual innovation. For these leaders innovation is the core of all value creation in business organizations. The inception of innovation is the “Fuzzy Front End,” as we have described it. In most mature business organizations the fuzzy front end culture becomes intolerable because it is so “unbusinesslike.” But these leaders of continually innovative enterprises have learned to love the fuzzy front end and to keep it central to the enterprise.

The Seven Principles at Work in Highly Innovative Companies

Principle #1: Sustain Faith and Treasure Identity as an Innovative Company

Leaders of highly innovative companies demonstrate in every decision, action, and communication that innovation propels profitability. The emphasis is on developing whole new business concepts, product platforms, mapping generations, and systematically

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2 Yamada, Toshiyuki, President of Sony’s Research Center, was the first representative from our study companies to call after receiving our findings. Such an omnipresent pattern, he said, was very important to Sony at the juncture of designating their new leadership, the first from outside Sony.
Exhibit 2. Interview and Analysis Methods Borrowed from Cultural Anthropology

Interviews

We asked each company to identify 2 or 3 very innovative products and some participants from marketing, technical/invention, and mid-level management who were active in the earliest stages of the product’s conception. Experience taught us to request interviews with corporate “storytellers.” In addition, we met with heads of companies, divisions, research labs, and subsidiaries. We visited both headquarters and divisions of these global companies. We also interviewed Polaroid employees worldwide.

Our visiting interview teams at each company consisted of 3 people, also representing the same cross functional mix of marketing, technical/invention, and mid-level business management points of view. Our methods for interviewing, observing, and analyzing came from cultural anthropology [3: “Exhibit 2 Cultural Anthropology” and “Table 1 Comparison of Two Methodological Paradigms”].

Therefore, our guidelines for each visit were: to suspend our earlier judgments and hypotheses; pay attention to the larger context, look at the situation from many angles (a 360° or systemic perspective); notice the process we experienced entering each company; and learn from our own intuition (the tool for “discovery”) and perceptions during the visits. We probed and listened to interviewees, following their path, rather than directing the interviews. When we encountered problems (for example, Océ set our interviews up jointly with marketing and technical partnerships, though our request was to speak with these representatives separately) or opportunities (such as the chance to follow our intuition and interview storytellers), we tried to understand if such problems or opportunities pointed to something important about the company (Océ was remarkable for the quality of marketing and technical partnerships) or the topic of invention and innovation. We discussed such problems or opportunities with our interviewees in order to jointly learn more with them during the interview or visit. During each company visit we were seeking qualitative information, diversity of insight, intensity of contact, and personal experiences more than quantitative data. We had thoroughly researched each company and the literature on invention and innovation before scheduling our visits.

We also became cultural anthropologists in the way we observed experiences within our own company. The two inventors on our project team were astonished to detect that people at Polaroid reacted to the idea and activities of our research project with the same patterns of behavior that our corporate culture exhibited when relating to their new technological ideas at that time. We were a microcosm of the culture of innovation at Polaroid; we even had to go underground for a while.

Analysis

Cultural anthropology was also the source of our methods of analysis. We further developed anthropological methods to fit our corporate circumstances. The visiting interview teams of 3 selected the most representative segments of video from the company interviews. The full team could then fruitfully engage in interpreting the data and experiences gathered from each company, almost as if we had all been on the visit. As we went along, we took time to invest the full team and our key sponsors with the learnings from each subsequent company visit.

At the end of all the visits to study companies, one of our sponsors and the team reviewed all the videotapes and interview transcripts. Then, small cross-functional partnerships of 3 team members from diverse backgrounds identified the most striking themes as they were expressed in each transcript. Multiple diverse views of the same data is a method verified by experiences in market research as well as cultural anthropology [6].

We then worked as a full group to identify the patterns and themes that were present in all the companies within each of the three regions. Only at this point could we document that all the companies, regardless of geography or nation of headquarters, shared one set of patterns, themes, or principles.

We did not “report” our team’s findings to our sponsors or senior management, in the strict sense of the word. Rather we invited them to attend “Creative Engagements” or symposia. We all viewed the representative videotapes from each company and engaged in further discussion and interpretation of the meaning of these for our company. At each symposium we asked participants: (1) What did you discover about invention and innovation from the videotaped interviews? What stands out? What surprises you? (2) Why are these key learnings and surprises important to you? What does this mean to you personally and your company?

Our extensive database of videotaped narrative interviews, qualitative analysis, and further interpretations by leading company practitioners, continues to grow as we conduct similar symposia in our study companies and work with other companies. Some of our study companies have responded to our findings with yet another round of innovative insights and activities. Observing this we learned again that innovative companies carefully craft and continually take new actions to sustain their innovative cultures!
"destroying one's own." Continual innovation is their soul business. All other business concerns flow from this single overriding purpose.

Often the leader's role in innovation is to set challenging targets. At Sony the leadership set ambitious schedules for both the CD and the 3.5 inch floppy disk projects:

... not only clear, but also challenging targets—that is the very key for innovation... Yes, a sort of 'voice from above' that does not question the possibilities and absolutely believes it is possible. The discussion of 'if there is possibility' will go into a negative spiral... So, I conducted an orchestra of friends and colleagues I had known for 25 years in order to make the schedule.3

The most successful companies are those that create inventive and innovative work "at the margin," continually bring such new ventures into the core business, and drop others out, often by cannibalizing and obsoleting their own. As another key player in Sony's CD project told us:

... There were an awful lot of stakeholders in black vinyl, but my nose told me, 'This [CD] technology will build up very steadily and constantly and will invite something new for the record industry and the hardware industry.' I just caught some scent of the flavor of it by myself. Of course, I asked a lot of questions of Mr. Tsurushima [the CD Project Leader], and Dr. Nakajima [the Technical Leader and inventor]. Then, gradually, I generated my own confidence for myself.4

3M not only treasures their identity as an innovative company, they emphatically advertise it. All the innovation "self-talk" at 3M is truly reinforcing to the efforts of their people. Slogans and mottos are not at all trivial to the task of crafting their culture of innovation, but provide an ongoing sense of identity and self reference. We found that 3Mers talked about measurements the most, though all companies had worked to find the most effective metrics to motivate innovative activities.

HP moved away from "break even time" to a more immediate feedback metric, a "slip rate" measurement that is married to a running analysis and interpretation of the causes of "slips" in a new product development project schedule. They tally these on a pareto chart that also documents the causes of slippage in each phase of new product development, from the initial idea investigation phase on into the market introduction phase. Then, improvement programs focus first on the most frequent causes of slippage.

In all the companies we studied, such corporate wide metrics and goals are baked into business goals and performance measures for groups at all levels of the enterprise and are central to the personal goals and performance reviews for individuals. Such measures also contribute to an innovative identity and the ability to maintain self reference as great changes occur.

Our study companies measure the internal "success rate" of research projects and programs, including starts and failures or ends of programs in development. This is a reminder to senior leadership and is a measure of how many good ideas need to be worked on in order to have even one market success. One hundred investigations for every market success was a common rule of thumb.

HP teams know the amount of revenues to be earned or lost for each day a program may enter early or late into the market. Using this dollar amount as a decision criterion for development costs, a team chooses resources to shorten time lines, stick to the critical path, or unjam a bottleneck. If the team members need to ask the Program Manager, s/he has one day to respond, then the decision is bumped to the next higher level.

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3 Tanaka, Yoshinori, General Manager, R&D Coordination Department, Corporate Technology Group. Interview at Sony Corporation, Tokyo, Japan. June 17, 1993.

4 Suzuki, Akira. Director, Tohokushinsha Film Corporation. Interview at Sony Corporation, Tokyo, Japan. June 17, 1993. Mr. Tsurushima was the CD Project Leader and Dr. Nakajima, now retired, was given an Imperial Award for his invention and technical leadership in the development of the CD.
each day. In 4 days the CFO is deciding. HP applied this decision-making approach first to an integrated set of software development projects and then broadcast the results and approach company wide by a series of HP educational videos.

Eventually we came to understand that such metrics, and the ensuing visibility of improvement programs, are more than just good business process and discipline. They do much to sustain employees' "faith" in the innovation process, keep motivation high, and, as a result, spur even more initiatives. A robust and productive product development process similarly sustains faith and makes innovation worth it to thousands and thousands of creative people. Without business process disciplines, measurements, and continual improvements to all phases of the invention and product delivery process, good ideas would remain just that — ideas. Creative and inventive people fervently work to see that their ideas come to fruition! The crafting of an innovative culture requires creating an environment of faith and trust that good ideas have a likely chance to become great products.

**Principle #2: Be Truly Experimental in All Functions, Especially in the Front End**

Successful product and service innovation organizations are truly experimental in the front end. For

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<th>Table 1. Three Micro Cultures of Innovation</th>
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<tr>
<td><strong>Fuzzy Front End</strong></td>
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<tr>
<td>Experimental</td>
</tr>
<tr>
<td>High tolerance for ambiguity and uncertainty</td>
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<tr>
<td>Chaotic</td>
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<td>&quot;Unreasonable&quot;</td>
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<tr>
<td>Enjoyment of the Quest itself</td>
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<td>Unpredictable</td>
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<td>Much individual activity</td>
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example: 3M now requires 30% (up from 25%) of sales to come from new products introduced in the last 4 years (down from 5 years). And they carefully define what they mean by “new.” They designate 7 classes of central and divisional technical work. “New” means “Class 5” technical work at 3M. Occasionally “Class 4” is considered “new,” but only if “Class 4” results in taking a product, related to existing business, into a totally new market.

...We’re putting together a portfolio of new programs in my division that we want to sponsor and support. We call these “Class 5” programs. Class 5 are “Unrelated Business programs.” There’s a multiple class system. Class 1 is what’s called Sales Support/ Tech Service. Class 2 is Production Support. Class 3 is Support for Current Business and Process Development. Class 4 is Related Business Product Development. Class 5 is Unrelated Business Product Development. Class 6 is Research. Class 7 is Basic Research. Those are the 7 classes of how 3M Corporation divides up technical work.

Each laboratory has their portfolio. I know how many dollars go into and how much of our time is spent in Class 1, 2, 3, 4, 5. And I can give you all the statistics for my lab. Class 3 is Current Business and Process Development. That’s the core of my business. Class 1 is Sales Support. That’s Tech Service. Every time a salesperson calls, a customer’s got a complaint or a problem in the field. I’ve got to have Class 1 resources. And so without losing my handle on what I need to do to support current business, I dabble in Class 4 and Class 5.

And we in 3M have a norm now of every technical director sponsoring at least one Class 5 program, because Class 5s are the future growth opportunities. They are the future potential for multi-hundred million dollar businesses, because Class 5 is unrelated business.5

All the companies we studied create “safe havens” for small amounts of highly experimental work by all functions. 3M’s 15% rule allows people 15% time to work on self-defined innovations. The 15% rule was at first only applied to technical people. This is still the more usual, but we found references throughout the culture and recommend it for all functions. Fifteen percent means 15% of a person’s time, 15% of a colleague’s time added to your time, 15% of machine run time for experiments, 15% of a budget in key functions or in a business, depending on how an enterprise is organized.

Based on one person’s initiative, 3M has recently committed a full-time resource to spend a year with Eric von Hippel at MIT to develop a practitioner’s version of his “lead user method” to identify new markets. Such fellowships have been frequently developed between 3M and MIT, but more usually in technical areas. In this case preliminary research by the “visiting fellow,” the year’s on site experience in von Hippel’s lab, and the integration of the 3Mer’s learning with skillful training resources have created an accessible and serviceable curriculum resource for marketing and new product teams at 3M.6

Sony has Tokyo laboratories for “next generation” exploration that are located inconveniently away from ongoing business activities, in locations where “a bowl of soup will get cold if carried from headquarters to the lab.”7 Dr. Nakajima, winner of an Imperial Award for Technology, attributes the success of his work on digital sound, at a time when the industry and Sony were committed to analogue, to the location of his lab and the protection of his supervisor, who contained his excitement until Nakajima’s ideas were developed enough to take forward for presentation.

For similar reasons HP has a concept of “G-jobs” (“government jobs”) that are projects undertaken by individuals, using company equipment and resources for unauthorized, even personal work. They have tracked the relationship of this personal work, such as building a pump for a small pond, to such company breakthroughs, as a team’s work to design a gas spectrometer.

Sony and Toshiba both have small organizations, with projects budgeted for 6 months at a time, to take new products from the Concept Phase to Sales Development in small quantities. This approach to product planning is called “Darwinian selection” by Dorothy Leonard-Barton [10]. The point is to keep small scale and run things all the way into the market before investing a lot in order to: help define the market, create a technological standard, and identify an initial group of early adopters. This requires experimental


and early participation from a variety of functional groups, not just R&D.

... Not only in our company, but also in other companies we are facing some problems, and we’re thinking about the efficiency of R & D, specifically how to introduce the products of R & D into business areas and create new markets, especially in the case of totally new concepts, where there is no business group yet formed to support the project. So the development laboratory takes a project from research to the market.

In the current system, with an existing business, after research and development has a good result, then we move the project to the business group efficiently. So we directly support the current state of the business.

The question is if we have a new idea that doesn’t match those existing product lines, what happens to the new idea? And in this case, this development laboratory is able to take a brand new idea to the market. If we try to get the consensus with the existing business groups, that project would be crushed. Business R&D groups are funded by each business group and corporate laboratories are funded by corporate. The potentially new product that does not fit the existing businesses would be separately funded in the development lab.⁸

Another approach to business ideas that fall outside the current structural definitions is 3M’s. 3M awards $30K “genesis” grants to fund the early stages of innovation programs that don’t fit the current business structure. These funds are allocated by a panel of colleagues, fellow scientists.

All our study companies have people dedicated to keeping (computerized or other) active databases to collect ideas and create access to them. If a project does not go ahead at first, they assure and secure documentation of all ideas and investigations for better timed opportunities later. Océ, a maker of computer peripherals and specialized CAD applications and products, calls this their “refrigerator” for ideas.⁹

Xerox Palo Alto Research Center (Xerox PARC), where we conducted a preliminary visit and interviews, developed a product concept while working to support collaboration in new product idea generation and development activities among their own staff. They have a prototype of a computerized community “whiteboard,” to promote the collaboration most innovations require [15].

Their concept was “WYSIWIS” (pronounced “whizzy whiz”) or “What You See Is What I See.” One person can manipulate the words and symbols of another, leading to true “co-creation” of ideas and concepts. Everyone can see ideas as they are generated and this often spurs their own thinking. The software makes it easier to participate and contribute: people from very different backgrounds and locales can comment on and share in constructing an idea. Ideas can be expressed, captured, built upon, sorted, and categorized without interrupting the verbal flow of conversation or necessitating co-location [14].¹⁰

Being truly experimental in the front end means understanding that some new ideas are significant enough to redirect the strategy of the enterprise. More than 25 years ago at Polaroid the SX70 camera, the integral film and camera system that emerges from the camera, self-times and self-develops, without anything to peel apart, was begun as “Special Experiment #70” (SX70), but became the basis for all the new instant photographic product systems since. The more recent beginning of digital photography at various photographic companies was similarly designated as “special experiments,” worked “off the beaten track” of new product development projects.

**Principle #3: Structure “Really Real” Relationships Between Marketing and Technical People**

High performance product and service innovation organizations structure strong, direct interaction between visionary business/marketing people and technical inventors. These really real relationships, not just structured work assignments, operate both formally and informally. People know where to go with radically new concepts to get nurturing for their ideas and help from people in other functions.

In addition, these relationships, when brought to bear early in the idea and concept generation phase, serve to resolve the traditional tensions between cost control and experimentation. Now the emphasis can be on strategic fit and building alliances for extending or redirecting strategy. “Otherwise, the technology peo-

⁸ Tanaka, Yoshinori, General Manager, R&D Coordination Department, Corporate Technology Group. Interview at Sony Corporation, Tokyo, Japan, June 17, 1993.

⁹ Dupont, Jean Pierre, Vice President, Marketing and Strategic Planning, Engineering System Division, Océ. Interview in Créteil Cedex, France. September 2, 1993.

ple always try to take control and the marketing people are too conservative.'\(^{11}\)

3M people speak in apparent code, about a "3-legged stool." As we listened to story after story of invention and innovation at 3M, each one told of early seemingly "automatic" connecting between marketing, technical, and manufacturing people. This occurred informally at first, with people from the other two elements of this "3-legged stool" joining the first to share an idea. The connections, it was explained, are useful just to bounce off ideas, and add informal resources to early investigations.

Sony makes especially effective use of the Japanese practice of rotating managers for 2–3 year assignments in marketing, product planning & development, manufacturing, and finance. Many people refer to Sony marketing and product planning people as "technically astute and [their] technical people have marketing savvy." The experiences gained and relationships developed help keep the views of the Chairman [Akio Morita] active in practice.

Océ distinguishes itself as a "market driven company," not a "Marketing driven company." Océ assigns all new product work to small partnerships or groups of co-located, cross-functional people. Other work is also assigned to multifunctional partnerships or teams, so relationships are deepened.

Our study companies look for and implement a multitude of ways to create "connective tissue" and a "campus vs. commuting college" atmosphere among their people. They invest in and sustain all of these, rather than look for only one method to create relationships across functions [7].


\[^{12}\] Tanaka Yoshinori, General Manager, R&D Coordination Department, Corporate Technology Group. Interview at Sony Corporation, Tokyo, Japan. June 17, 1993.

**Principle #4: Generate Customer Intimacy**

Generating customer intimacy is very closely related to being truly experimental in the front end of all functions. "Consumers are clever. They need something totally different."\(^ {13}\) Innovative companies develop many ways to interact with customers and users. There is no single "best way" to structure these innovative interactions with customers. All the innovative companies we studied have "sensor" people and a great variety of "sensing" activities that maintain their antennae in the outside scientific/technical and customer worlds.

Marketing and technical people together engage in a host of formal and informal relationships with customers and end users at the front end. They are especially active before having a particular product concept to explore. Connecting-with-the-customer-activities occur at all levels in the enterprise and continue through all stages of the product creation process. What is remarkable in these enterprises is their up front involvement with customers.

An example of such involvement is HP's "scanning teams." To identify new opportunities and new ideas, HP has scanning teams—partnerships of two or so people, equally balanced with technical and marketing expertise—who go out and about to scan the environments of use of their current, former, and potential customers; to gather "premonitions" of future scientific and industry trends; and to acquaint themselves fully with competitor products and direction. Supporting the scanning teams' efforts is systematic background research from other HP groups. From this research and the scanning team's intelligence gathering the teams routinely make "maps" of innovation targets that match customer and market opportunity areas with emerging internal technical capabilities.

People on the scanning team are able to follow a new concept by becoming part of the investigation and new product development team. Once a project begins, HP monitors each effort against 10 factors the company has found crucial to product success. These include understanding user needs; alignment with HP and divisional strategy; competitive analysis and product positioning; technical risk assessment; priority criteria as to cost, schedule, and features; regulatory compliance; distribution channel considerations; con-
tinguing commitment to the market; endorsement by upper management; and total organizational support.

An internal company study led by Edith Wilson found that successful projects performed well on all 10 factors while unsuccessful projects had been inadequate on one or more factors [17]. Of 20 projects studied, no project succeeded if it ignored the single most important factor, the necessity to understand customer needs.14

HP has been actively moving from being a technology driven company to becoming a customer driven company, since 1991. The Corporate Market Research group, the Medical Group, and others have looked into various new approaches to generating more connection with customer environments and interviewing customers, such as "voice of the customer," "concept engineering," and our cultural anthropological approach.15

The general manager of the Medical Group makes a point of visiting customers (frequently those who are not currently HP customers) on a worldwide basis at least once a month. Senior leaders are specially trained so they can better "probe and listen," an anthropological approach, rather than "direct" the interview or attempt to "make a deal" with current and potential key customers. In addition, every new engineer in the Medical Group attends a course in physiology and a 2-week internship at Boston University Hospital, where s/he follows residents, nurses, and doctors on their rounds at University Hospital.16

HP's senior level customer interviews are part of gathering customer requirements for what HP calls "Phase Zero," before any product concepts are considered. Once a project is in Phase Zero, partnerships of a marketing and a technical representative go together to customer sites, similar to the scanning teams described above, completing some 25-50 interviews worldwide. It is important that the interviews be conducted in person in the customer or potential customer's environment. This allows the team to observe and collect contextual, implicit and qualitative data, that would be overlooked in other methods of data gathering.

Concept engineering is a quite structured customer centered process of data collection, reflection, and clarification. It was jointly developed from 1990 to 1992 by professors at MIT and several founding members of the Center for Quality Management (Bolt Beranek and Newman, Gen-Rad, Analog Devices, Bose, and Polaroid) [5].17

In addition to using an anthropological approach for the interviews, concept engineering uses a special "KJ" methodology (based on the "affinity diagram" developed by Kawakito Jiro, a Japanese anthropologist) to distill images and requirements of the customer environment. Later analytical steps use more quantitative techniques to measure the intensity and frequency of perceived needs.

An extension of this kind of approach is "empathic design" named by Dorothy Leonard-Barton, from her observations of highly innovative designers. It can be used for adapting known technologies to users' needs, such as the functioning of doors on automobiles, or for radically new technologies and products, such as Personal Digital Assistants (PDA's).

In addition to standard market research and traditional interviews providing all the information they can, technologists accompanied by someone knowledgeable in the marketplace, observe and videotape various users' practices in detail, such as the opening and closing of automobile doors in the streets of New York or people's actual behaviors as they utilize a wide spectrum of electronic devices that may all be integrated into a PDA. Having sophisticated technologists in the potential customer's environment of use builds empathy and reveals opportunities for product uses that the potential customer would not conceive and therefore would not identify in a more traditional market research data collection process. In this way the designers are able to identify elements of design that will make the product more "empathic" for customers [10,11].

Using this approach, HP Medical Products observers found and solved logistical problems with complex video directed surgery equipment. The doctors and nurses neither articulated nor perceived these problems. They were identified by having HP expert trainers present in operating rooms while doctors and tech-

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14 Author's conversation with Edith Wilson, October 21, 1992.
15 HP was the second recipient of The Product Development Management Association's "Outstanding Corporate Innovator Award," presented in 1989. Much of the work in the Medical Group at that time was important to HP's application.
17 Professor Shoji Shiba and Ph.D. student Gary Burchill of MIT. Founding companies participated in a variety of ways. For example, Polaroid contributed a New Product Delivery Support staff member for almost 2 years with additional research and administrative support to assist in the generation of the method and to develop training materials.
ticians were completing their final qualifications to become certified in using specific HP equipment.\(^{18}\)

Apple and HP both have developed creative and useful ways to package and communicate the rich qualitative data that can be gathered using a variety of these customer focused approaches. They each produced internal videos, “The Office of the Future” and the “Hospital of the Year 2000,” respectively. The HP video is very realistically but futuristically staged around specific clinical cases. It shows these being managed by technologies that leading edge hospitals anticipate 5–10 years from now. The totality of the hospital scenes depicted comprise a holistic vision of HP technologies integrated and linked together in innovative ways to support the customer and the patient.

Through such processes of “being in the customer’s shoes” or “having the customer on the team,” leaders of successful, continually innovative companies focus on a common purpose and create a heightened sense of opportunity, urgency, and strategic targeting to stimulate their individual innovators, diverse specialists, and collaborating organizations [2].

**Principle #5: Engage the Whole Organization**

Leaders of successful, continually innovative companies create a sense of community across the whole organization. In these companies everyone connects with a common inspiring purpose, knows why they are working together, and participates in innovation as the fundamental way the company creates and brings basic new value to customers. Each person experiences his/her role as key to the company’s innovative performance, and has found a way, with the organization’s encouragement, to align the purpose of their life-work with their work-work.

The organization as a whole is called to high performance in product and service innovation. Invention and innovation activities are not delegated to one or only a few people, groups, or functional areas. This includes a highly visible, encouraging role for top management—it is not necessary to be the technical inventor or innovator, but to be the innovation leaders calling for, recognizing, and acknowledging innovative results in others. For example at Club Med:

...We spend more time going there, talking to the people, gathering the people together, than writing papers, sending memos, sending videos, taping things. This is against our culture. Our president is going to retire this year, he is 73 years old. Every single time he has a decision to make, he’d rather go there by plane, physically be there with his team, and share his idea or decision. And that’s something that we all do in management. José spends all summer going to the resorts, to see how each and every team is matching with the need of the customers. I spend more time going and doing conferences about how the company is doing, our innovations, our new products, what we’re going to do tomorrow, than just signing the catalogue with a nice little note saying this is what it’s all about. So we believe very strongly in passing on those messages person to person.\(^{19}\)

3M’s abundance of rewards and recognition (big, little, daily, weekly, annually), such as “The Circle of Technical Excellence,” reinforce that people are the most important resource for innovation. At the time we were visiting 3M they were discussing how to encourage “champions” of innovative people and their ideas. As with other desired behavior sets, they decided to establish a new award, publish and broadly communicate the criteria (the desired behaviors) so that peers could review the criteria and nominate awardees. Their published criteria will also motivate people to exhibit these behaviors and others to recognize and emulate them. In this way, 3M’s expansive reward and recognition system develops people in new roles as well as rewards successful results.

HP, Apple, and Club Med are all explicit that good ideas come from sources internal and external to the enterprise. One of our Japanese study companies is adamant that the best ideas come from the middle of the organization, where people are closely linked with customers. “You need passion. Any top-driven product with too many people [politically] involved will not succeed.”

Océ, 3M, Sony, and Apple all have formal, regular “meetings” (some electronic) to compile and interpret what is learned from customers and to make sure everyone in the organization knows what “we” know. They work at engaging the whole system. HP, Sony, and Apple also make video tapes for internal information, process, and idea sharing.

**Principle #6: Never Forget the Individual**

All of the interviewees in our study reflected a sense of adventure and wonder. These individuals provide curiosity, commitment, and courage. Carol Steiner re-

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\(^{18}\) Halloran, Interview, April, 1991.

minds us of Heidegger’s philosophy of human nature and its applicability to innovative enterprises: It is human nature to be *practically involved in a complex world* rather than rationally involved with a conceptually simplified world; it is human nature to be authentic, i.e., *unconventional*, at least some of the time; and it is human nature to be *collaborative* [8,16].

People spoke of feeling energized, saying, “Success breeds success.” At Sony, inventive and innovative people were brought back from retirement and assignments in other (related) companies to interview with us. Sony people remarked that their partner company in some of the CD development work had no idea where to locate the highly inventive people who had been on that team in the 1970s and early ‘80s. The Japanese companies where we interviewed reward inventive and innovative people at two points in time. The first is when an idea is evaluated as worthy to try and it is human nature to be 

Many interviewees described their experience as “fun.” We were asked by the senior editor of a very distinguished business magazine, “Aren’t managers concerned about ‘burn out’ for their employees if everyone is involved in such self-motivated innovative activities?” We replied that we observed this high energy and productivity for self and the company to be much preferable to the “snuff out” of people in organizations that do not encourage and support the intrinsic motivation of individuals to be creative and innovative. While it is never easy to bring a new idea to market, working for a company where new ideas are fostered and supported gives our interviewees a sense of direction and possibility, of having the freedom to think for themselves and for the future of their company.

Actively helping individuals create a linkage between their “work life” and longer term “life work” is a crucial step in generating an environment where innovation and high productivity flourish together. Management cannot control this process, or direct it in detail. But it can actively energize and support many linkages between individual purpose (intrinsic motivation) and organizational purpose (extrinsic motivation) [1].

At ICI Polyester (Imperial Chemicals Industries), despite the company’s long history of past innovations, Global Melinex Chief Executive Jim Alles and a leadership group became convinced that its people’s innovativeness was in danger of becoming limited. He assembled 75 people from top marketing, technical and leadership positions worldwide to develop an initiative to improve innovativeness. The core of this initiative was to begin discussing the goals that were meaningful to these individuals in their own lives and to take a fresh look at their organizations’ work in terms of those goals. Alles’ directive for the project became to “create an environment where people will work at what they are best at doing and what they like doing best.”

During the meeting, as the participants—including executives such as Alles—began to discuss how their own life purposes might connect more fully to the innovation needs of ICI in its business climate, the participants soon noted a prevailing disconnection and use of “we-they” terms in describing critical organizational relationships. This discussion led to three important steps: (1) active management of these disconnecting attitudes during the meeting itself, (2) the establishment of a long-term process to open discussions to better connect life-work and work-work at all levels, including qualitative ways to establish progress, and (3) a commitment by all the executives to fully participate themselves in each step they asked employees to undertake.20

**Principle #7: Tell and Embody Powerful and Purposeful Stories**

The stories told in highly innovative organizations support and reinforce the principles and practices of innovation. Innovative organizations *treasure* their identity and support their faith with an abundance of stories, teaching parables, myths, and legends that foster and align the myriad innovative activities in highly successful innovation organizations.

In our work with study companies and others since conducting our worldwide study, we have demonstrated that collecting and understanding the organization’s *founding* stories is important as a first element of intervention and rejuvenation [3]. Often the founding stories of these companies include novel business concepts, not just technical inventions or service breakthroughs. Perhaps the story of the founding of Club Med is new to you, as it was to us:

The man who created Club Med years ago was Gerard Blitz from Belgium. He was a swimming champion and a very good water polo player with the Belgian team at the Olympics. He had been contacted to help with the reintegration of former prisoners of war |after

World War II]. People knew that they couldn't just take the prisoners of war back to their families right away. They had to help them start step-by-step, to give them back first good health, and some rest, and some food, and to have some medical assistance, and everything. They created this kind of place in Switzerland, in the mountains. And he was in charge of this entire development.

After the war, and after this entire project, lasted a year or two, I think, he said, “This is a great system: to have the people all together and to have their families visiting them at the same time. It would be great to do this as a kind of vacation. To have a place where everybody was working and playing together: cleaning their rooms, and cooking, and playing volleyball, and relaxing, walking, having a little hike in the mountains. It would be nice if we could have a team taking care of all those things, and having people come and vacation with us.” He wanted to go with his friends and live in a place where they could have fun.

So they decided to create the first Club Med village in the Balearic Islands. It was very focused on the ocean, on spear fishing, they all were good swimmers. So they went there to have fun, do some sports, play volleyball, and play some music at night, and dance—like you organize a party in your country [the USA]. So this is what they decided to do. They created this first Club Med village, and this is how it all came about.21

... And the timing was also perfect. In 1950—I don’t know about in America, but in Europe very few people had been to the ocean. Few people had actually swum in the water. Vacations were for wealthy people. You had to have money to vacation at the ocean. I mean, if you had to have a house, or money go to the hotel and to pay for the hotel room, that was an expensive type of vacation. So most people either didn’t take vacations, or when they did they would go to their families, which were most of the time in the countryside. They went camping a lot.

In between luxury and nothing, there was a big vacation gap. This gap was filled by guys like Gerard Blitz, who also said, “Because we’re going to share the cost of sports equipment, sport gear and so on, it’s going to be less expensive for everybody. We’re going to buy a water-ski boat, we’re going to buy some spear-fishing equipment, some scuba tanks, and it’s not going to cost too much because everybody’s going to use it.” And at the same time, the idea of this club was ‘Let’s share together!’21

At HP one member of the PR department views her job as collecting and shepherding the publication of HP stories in external media so that HP people will hear/read them, get ideas, and put them into practice. Being mentioned in a story of innovation, published or not, is a significant non-monetary reward in all these companies.

Rich and Profuse Networks of Relationships

Two other conditions found in highly innovative organizations are: (1) total interconnectivity among remotely located individuals and (2) permeable boundaries across all systems and work groups, even those external to the enterprise itself. Knowledge, not necessarily people, is what needs to cross organizational boundaries. Hence, creating productive knowledge interactions among individuals is where the emphasis is needed [12].

The innovative productivity of a collaboration comes from the differentness of the individuals in a group, not their sameness. “Connectedness” requires wide ranging interests and a profuse network of interactions with others. This takes time, conscious reaching out to different people and skills, and a culture that rewards lateral participation.

Aligned Purpose

How do leaders within an enterprise deal with the highly diverse backgrounds, disaggregated organizations, and multiple locations generally found in our global innovative activities? Innovative collaboration demands strong alignment at three levels: (1) to the individual’s own goals in life (for creativity and motivation), (2) to others in the enterprise (for collaboration), and (3) between individuals in the enterprise and the larger society (for creating value).

The process starts by focusing equally on the overarching organizational purpose that bonds members of the enterprise and on talented people’s intrinsic desire to collaborate with others in order to create something truly new and of value in the world. Successful leaders tap into these intrinsic motivations and align extrinsic opportunities and incentives to encourage members of the enterprise. Both clarity of purpose and alignment of organizational and personal purpose are vital to sustaining the passion and commitment of a culture of innovation. Active alignment of purposes can lead to much more creative outcomes and a self renewing process both within the enterprise and between the

enterprise and its external partners and stakeholders [9,13].

Such highly innovative systems cannot be planned and directed in detail, they cannot be "rolled out" but must be "co-created" and nurtured by all the members in the whole organization. The specific practices of other companies give us some ideas, but we must create our environment of innovation so that practices, that are true to the whole set of innovation principles, are also consistent with our corporate culture. Crafting a culture of innovation is a "story of connections" between one person and other employees; between employees and external partners; between employees and the organization's purpose.

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