Information ● Knowledge ● Systems *Management* 2 (2001) 223–227
IOS Press

Betting on Technology Leadership
The Genesis of Motorola Labs

An Interview with Dennis Roberson

Dennis Roberson is Senior Vice President and Chief Technology Officer of Motorola. He is responsible for Motorola's future technology direction, and its Technical Community and specifically the company's Global Software Group, standards efforts and its research organization, Motorola Labs. Prior to joining Motorola, Mr. Roberson worked at IBM, Digital Equipment Corporation (now part of Compaq), AT&T, and NCR with a broad array of work experiences in areas as diverse as semiconductor process and device development, applications, systems and operating systems software development, and the development of the full gambit of computer systems from the PC to minicomputers to mainframes to the world's largest data warehouse systems.

IKSM: In recent years, the value of R&D has been questioned in many companies and asked to prove its worth to the enterprise. Many well-known R&D organizations such as Bell Labs, IBM Research, and Xerox PARC have been scrutinized and, to a greater or lesser extent, reoriented and reorganized to provide clearer value to the business. In light of these trends and events, why was it a propitious time to form Motorola Labs?

Roberson: The timing of the establishment of Motorola Labs was driven by several factors. First, Motorola had been through a difficult period as a company with low growth for three years and a heartfelt need to explore different ways of organizing and running the business overall. Second, there was a general feeling that Motorola's research investment was not yielding the desired results. Third, I arrived on the scene with a "clean slate" and a desire to make a difference for this great company. This set the stage for a thorough evaluation of the effectiveness of the research effort at Motorola and a benchmarking effort to understand how research at Motorola compared to the research performed by other major high tech companies.

The results of this effort suggested that we were indeed not as efficient as we might have been, and in particular that communications and cooperation could be improved. More fundamentally we found that because research was being largely conducted on a business by business basis (though Corporate Research also existed), we had no central understanding, much less coordination of the research activities. We also found that we were under-investing in research relative to the other key high tech companies we benchmarked. We found that we were "hard to do business with" for research oriented groups like universities, government labs, and partner and customer research organizations. Finally we found that members of the press and analyst community were questioning our technical vision and our dedication to being one of the leaders in the pursuit of new ideas in the communications and electronics space, much less the software and internet world.

In talking to my counterparts in many of the benchmarked companies it became clear that one critical element in the resolution of the problems cited above was to put the research effort together in a single organization, give it an identity and manage it with a focus on excellence in research. Many other elements were clearly needed as well including an improved business alignment and technology transfer process, a much sharper focus on the things that were really important to the mid-range future

and an expanded coverage of the technologies that might one day prove to be of interest, and a much improved ability and willingness to partner. Motorola Labs also needed to have additional investment to grow into the potent entity that it has become. Finally, much effort was needed on improved and uniformly applied management processes and practices to enhance the over-all operation of the organization.

While we have not "arrived" in all of the areas where progress was needed, we have made great progress since Motorola Labs was formed. Much to my delight and in some cases even surprise, the organization has been strongly and enthusiastically supported by both senior management and the global Motorola community, the press and analyst communities, our many customers, and partners in academic, institutional, supplier and telecommunications services.

IKSM: You mention responding to the mid-range future. Many industrial R&D organizations are focusing on adding mid-range efforts to their existing portfolio of long-range endeavors. What do you have to do differently to do this well?

Roberson: Motorola's pre-Motorola Labs history of doing most of its research in the businesses made the coverage of "mid-range research" a non-issue in that most of the research had become mid- to short-range oriented. Given this history, we are currently still working to establish a proper balance between long, mid, and short-range research. The mid and long range are beginning to be relatively well covered as short range research is completed and moved to the businesses and replaced by longer-term efforts, but we still have some work to do. Having said all this, really relatively little new effort has been or should be required to establish a focus on mid-range research.

To better understand this, mid-range research needs to be placed in the context of the overall research model we foster within Motorola Labs. If you always keep in mind that the result of good applied research is a new product, service, process or means of providing one of these, you in the end establish a continuum of research which progresses from the exploration of many concepts and ideas (with a limited percent of the research spend — less than 15%) to the selection of promising projects for more in-depth research, to the formal establishment of major research programs to the transfer of these programs to development organizations often with some of the key people who initiated the research topic still working on the project. If this model is followed, with all the infrastructure in place to support it, there will be no special challenge in pursuing mid-range research as a separate topic. To be sure not all research fits this model, but it is the baseline model for our efforts.

IKSM: In achieving this progression you outline, what are the relative roles of Motorola Labs and business units in determining the topics and issues researched, especially early in the technology funnel?

Roberson: Motorola Labs has the dominant responsibility for the technological future of Motorola and therefore is chartered to determine the topics and issues to be studied. This does not mean that people in business units don' t provide great ideas on areas to be studied, or that they don' t actually do investigations of great significance, but the responsibility rests with Motorola Labs. This responsibility has consequences as well. If the company is surprised by a new development in an area of vital interest to Motorola, the criticism can and should be directed to the Labs for a) not being on top of the area, and/or b) not adequately informing the relevant community in Motorola.

Since no group, no matter how technologically astute it may be, can hope to be omniscient on future technology developments, this also implies the requirement for a very strong set of positive global relationships with universities, research institutes, government entities, partners, leading edge customers, consultants, and "gatekeepers" to make sure that important (or even potentially important)

developments are always being reviewed. This also implies the need to be actively engaged in conferences, and well read in the right communications media to be aware of what is going on and to understand the implications. It also implies the need for work in the area of both developing and understanding key technology trends and interpreting the implications. Finally, Motorola Labs needs to be well connected with the CEO Office and the strategy and intelligence functions to make sure that the technology work is appropriately aligned with top-level business direction and is taking advantage of the learnings from our global network of business intelligence gathering personnel.

IKSM: You describe a very robust and proactive set of relationships and networks throughout technology and business communities. How do you form and maintain these relationships and networks? Is this simply part of researchers' job descriptions or do you organizationally support this process?

Roberson: The answer to the final question is clearly BOTH. The relationships and networks must be continuously evolved sometimes opportunistically and sometimes through very planful arrangements. Structurally, it is important to establish goals for both the quality and the frequency of the more formal classes of these interactions. Planned interactions might include such activities as customer sessions, joint research efforts, industry, government or university councils or technology focused forums, standards meetings, etc. Opportunistic sessions might include chance meetings at conferences, universities or government sponsored gatherings, or even at the soccer field. Beyond this, the set of personal relationships established over a lifetime and fostered through continuing interactions via email, phone calls, and direct interactions provides a rich baseline network for information transfer.

The key to achieving successful information transfer through these relationships is in always offering useful information to those you interact with, in training the whole research community to be interested and careful listeners, and in encouraging the transfer of information gathered to all those who may find the information valuable. These behaviors are by in large taught and incented rather than naturally endowed.

IKSM: You portray a very rich environment where knowledge of new ideas for products, processes, and technologies, as well as understanding of things that work, things that don' t work yet, and things that will never work, are exchanged among a somewhat eclectic set of participants. How can Motorola Labs keep track of what it knows? Is this knowledge simply in the collective set of heads of the people involved or are there additional mechanisms?

Roberson: This is an excellent question. The knowledge is de facto in the collective set of minds, but the challenge is to selectively extract this information and make it available to appropriate audiences both within the Labs and across the company. The selectivity is extremely important since we are all dealing with information overload. At the same time getting the information, knowledge and in the most optimistic case wisdom obtained by one individual or one group to those who most need it, when they need it is the enormous challenge.

While I wish I could tell you that we had the end all answer to this challenge, we don' t, but do have a few mechanisms that are of considerable help. First we have applied structure to the organization so people generally know what we are focusing on as a group and importantly what we are not currently focusing on. We also have assignments for who is responsible for each area of focus and yes we do have a Corporate VP who's generally responsible for "Other". Knowing these responsibilities, as people unearth interesting information they funnel it to those responsible for that class of information. At the same time when information is needed on a specific topical area, again the structure helps direct

people to the correct source for the information.

Beyond the people network in the Labs (which waterfalls to ever great levels of detail in each Lab within Motorola Labs), we have an established list of technical experts across the company who are identified as Science Advisory Board Associates (the top 1% of our technical community) and Dan Noble Fellows (the top 0.2% of the population). Each of these individuals is a technical expert in a specific area and these areas have been captured and logged to allow these people to be better accessed for knowledge or to serve as switch points for other sources of knowledge. This information is available on an internal Website.

Going beyond the people structure side of the information network, there are a variety of established means of sharing the wisdom and knowledge of the organization. One of the most valuable is the annual technical review sessions. These sessions are topically focused with a formal review of the key highlights and issues related to the technology area. Senior management (including the President and the Chairman and CEO of Motorola) and the senior technical community from across the company attend these events. Informal technology fairs supplement the reviews where their advocates present established projects and novel technology proposals. A guide is produced to assist the hundreds (to even thousands) of attendees at the fair and the fair is run into the night (with pizza served at the appropriate hour) to support a free exchange of ideas and information. Highlights of the fair are broadcast via the Net, captured as stories in the CEO Website, and stored as on-line videos for later review. This greatly facilitates the broad and free exchange of ideas and of the information, knowledge and again hopefully wisdom across a broad range of technical disciplines.

Finally, supplementing all of the above, traditional highlights reports are produced by most Labs and distributed via email, Websites have been developed to support information capture and dissemination, Quarterly Highlights presentations are produced and shared broadly for the entire Motorola Labs organization, and a global repository of information (called Compass) is used to store and log searchable information on the full range of technology based topics. Using this very rich fabric of information gathering, structuring, and dissemination techniques, the enormous wealth of technical information needed to support Motorola's array of businesses is carefully managed.

Even with all these tools and structure we are continuously looking for new and better ways to support the need for "just in time" information availability to support improved decision-making up and down the organization. A company level Knowledge Council has been running for the past year to help facilitate broad based process and structural enhancements in this space. With the pace of change and technology advancement, this opportunity for continuous improvement will be with us for the foreseeable future.

IKSM: Has the past few of years of birthing Motorola Labs provided any surprising insights that might help the many enterprises who are reconsidering the role and nature of their R&D organizations?

Roberson: There are many surprises, and at the same time many confirmations of expectations that the past two and a half years have provided. Among the positive surprises probably the first has been the broad base of support that the organization has received from across the corporation and particularly from senior management. This has been true even through the current financial challenges. At the same time, and especially given the significant level of support, it is always surprising how difficult it is to launch disruptive technologies. It is also surprising what is perceived to be disruptive. The fundamental principle here is the "Innovator's Dilemma" issue rendered popular by Clayton Christensen in his book by the same name. This difficulty in accepting new, less mature (and less expensive) technologies which are inferior (in the beginning) to the technologies they will ultimately replace is alive and well even in a very well run company like Motorola. It is an obstacle in most established enterprises worldwide.

A second positive surprise is how well Motorola Labs has been received by the research organizations around the globe, as noted in my response to your earlier question. This includes university research groups, the National Labs from various nations, and the research arms of our various customers and partners. This has enabled Motorola Labs researchers to multiply their effectiveness by drawing ideas (and clearly providing them as well) from some of the best research specialists in the world. This opportunity is available to most research organizations, but "not invented here" problems and concerns about intellectual property often inhibit companies from taking advantage of the opportunity to collaborate.

The third very pleasant surprise (in this case a hoped for surprise) has been the significant synergies that have been obtained as members of the various research disciplines have learned about one another and begun working together. This has resulted in various patentable ideas and novel concepts and integrated technologies that are currently working their way toward product introduction. These new ideas often have application in more than one of Motorola's businesses, which provides even more leverage and value. This "cross pollination of ideas" approach is available in one form or another to most companies and most research organizations.

The final surprise has been the positive relationship that we have enjoyed with members of the press from both technical and popular publications. By simply offering reporters an opportunity to glimpse the future and by openly responding to their questions, we have established many friends. This has been particularly helpful to our various stakeholders when they are concerned that our financial aspirations and attainment don' t quite match. Again, this opportunity should be available to most research organizations, but few seem willing to either expend the needed effort or risk the potential of occasional embarrassment.

The real excitement is in looking forward to the next technical surprise created by members of the research team, in discovering the next opportunity to capitalize on an obscure idea being pursued by one of our partners, and the next innovation in our process of managing our efforts. The best surprises are the ones that lead to brilliant new products or services that create a better world and a better future for large portions of the world's population. This creation of a bright future is after all the fundamental goal of a research organization.

IKSM: We greatly appreciate your sharing these thoughts with our readers. Your insights into the roles of R&D organizations, how these organizations should be supported, and how they can, in turn, support enterprise aspirations will surely capture the attention and imagination of many readers.