

Managing Multinational, Multicultural R&D

A Conversation with Craig Tedmon, CTO of Asea Brown Boveri

Jean-Philippe Deschamps and Richard Granger

Jean-Philippe Deschamps: We read a lot about the ABB culture but surprisingly little about the technology side of your multinational, multicultural business. Would you describe the organization of the technology resources within your overall global/local network?

Craig Tedmon: First, it is important to understand that ABB is the result of mergers of many companies. These include not only ASEA and Brown Boveri, from which our name comes, of course, but Westinghouse, Combustion Engineering, and even some former General Electric Company U.S. assets. As a result, although we are often described as a Swedish/Swiss or a Swiss/Swedish company, our makeup is far more complex. Our 211,000 employees are so dispersed that the largest concentration in one country – it happens to be Germany – is only some 35,000 to 40,000 employees, or less than 20 percent of the total. This means that no country dominates the company in terms of culture or population. In contrast, our competition is invariably dominated by one country.

Similarly, there is no one country in which we do a majority of our business. We're really multicultural and multinational in that respect. There's no „home culture“ on which we can base how we think or how we act. This means that in all our dealings, most of the people in any meeting are speaking a foreign language (and usually that language is English). But it also means that there's a major premium on careful communication.

Now we come to our technical resources. My own philosophy – and certainly that of my colleagues – is that technical development should be done as close to the customer as possible, because that's where you get the greatest understanding of what the customer needs today and what he or she will need in the future.

That means that in ABB, as in most large companies, most of our technical work is done in technical organizations within the businesses. In round numbers we spend about \$1 billion of discretionary funds each year in technology development, the large majority of it within the businesses for their own product development. *To me, that's how it should be, because the people who are close to the customer know best what the customer needs.*

Richard Granger: How do you manage this money that's spent in the businesses without imposing central control?

Craig Tedmon: First of all, we can't. Practically speaking, we can't really „manage“ R&D funds tightly, even in homogeneous countries. I don't think you can manage a billion dollars top down. So how do you control and influence this expenditure without taking away the prerogative of the line manager to employ resources as he or she sees necessary for that business? The idea we have developed and implemented is that each of our four major businesses – power generation, power transmission and distribution, transportation, and a large segment we call industry and building systems – has a senior technology officer (STO) who has clearly defined responsibility for the technological health of that business. The STO has the responsibility of making sure that his or her business has the right resources and the right people – who are working on the right programs to meet the short-term and long-term needs of that business.

This senior technology officer reports to the business-segment executive vice president and to me. This is not a matrix; it's direct line reporting. This is a significant point. It means that the segment executive and I agree on this person's objectives. We agree on his or her compensation, priorities, and allocation of time. Typically, these senior technology officers will spend the great majority of their time managing the technology in the business. But they also spend perhaps 15 to 20 percent of their time working closely with our corporate research people and helping to integrate the corporate research activities – which are funded partially out of corporate funds – into the needs of the business.

With this dual reporting relationship, I have a very clear mechanism for entry into the businesses at any time and any place through my employee, the senior technology officer. And, of course, I'm doing so with an employee of the senior executive of that business, so it's not at all as though I'm coming in through the back door, as a corporate meddler or even a corporate spy. I'm coming in with my employee who is also their employee. So we have a basis for very open communication.

Jean-Philippe Deschamps: Would you say that the role of this senior technology officer is similar to the role of the CTO or chief engineer in a Japanese company, that is, a largely executive function, focused primarily on steering the technology goal?

Craig Tedmon: Yes. These people are very executive, and they also have a lot of people who report to them directly or through a matrix. The organizational structure of our business segments is comprised of business areas, which in turn consist of business units. Nearly every business area has a senior technology officer who is responsible for tens of millions of dollars, sometimes more, in discretionary R&D expenditures. More important, that business area R&D manager is responsible for the strategy and development of the business. The chief technical officer for the whole segment, the senior vice president, must in turn make sure that the business area R&D managers do their jobs.

Richard Granger: Could we look for a moment at the corporate research centers? How has it happened that each of those centers has its particular areas of strength? Has it been purely an accident of history?

Craig Tedmon: Of the six centers, three are relatively large, with some 200 people each, and three are relatively small, with typically 30 to 75 people. The three large laboratories are the former ASEA Central Laboratory in Sweden and the two former BBC Laboratories in Germany and Switzerland.

These three laboratories functioned more or less independently through 1990. When I joined ABB on the first of January, 1991, one of the assignments I was given by Percy Barnevik was to integrate these three laboratories into one cohesive, smoothly functioning group. There was quite some pressure to define certain technical responsibilities for each of these geographic locations, to say that the Swedish lab would have responsibility for this area of technology, the German laboratory for that area of technology, and the Swiss for some other area of technology.

Richard Granger: Were these allocations of responsibility based on competencies?

Craig Tedmon: They were based on competencies or on the businesses that were strong in those countries or whatever.

Richard Granger: Did you move people among the centers to align your resources with the new responsibilities?

Craig Tedmon: In principle, we were willing to move them certainly, but it becomes a practical matter. It's a very large cost. You've got to uproot whole families just for an organizational convenience. Eventually we did a very detailed inventory of what technical capabilities we had and where they were located and then we did some prioritization. We asked, „Where do we need these skills?“ Sometimes there was redundancy that was independent of any organizational change. Basically, we just didn't need those skills. But there were also gaps. In one area we were building up our gas turbine business very rapidly, and yet if we looked at the technical skills required to support that business we saw some serious gaps and we had to hire quickly. For example, in high-temperature materials we had a few very good people but we did not have, in my judgment, enough people to really support the requirements of the business as it grew. We decided to substantially grow our resources in high-temperature materials.

I like to fish, and to my way of thinking, if you want to catch fish, go where the fish are and then try to catch them. To continue this little analogy, there are more high-temperature fish in Germany. So we looked in Germany and we hired quite a few people.

Richard Granger: Once you had the competency maps, how did you reorient the groups?

Craig Tedmon: We put together a task force consisting of people from all the laboratories, and we said, „OK, here's our technological or scientific inventory. How do we sort this out into logical packages?“ And when we did that, it turned out that we had about 15 general categories in which we could define nearly all our technical work. A typical category, for example, would be combustion and fluid mechanics. Others include high-temperature materials, acoustics, power electronics, dielectric insulating materials, and air pollution control. Some of the programs – we call these things programs – clearly lined up with one or two businesses and some of them lined up with many businesses. Then we asked ourselves how to manage these, because the people were of different countries. Take the dielectric materials program, for example. Altogether we have 60 or 70 people working in this area, located primarily in Sweden and Switzerland and secondarily in Italy and Finland. After a number of workshops in which my management team asked the question, „How can we best manage this?“ we evolved a straightforward matrix system in which each program has a program manager.

Jean-Philippe Deschamps: Does the program manager manage resources and areas of focus?

Craig Tedmon: The program manager has the responsibility for defining the technical strategy of the program, and to do that he or she has to understand its business needs. So we've put in place a process we call Strategic Technology Planning. This basically creates a medium-to-long-range plan based on known business requirements, put together with a lot of input from the business people themselves. The Strategic Technology Plan forms a rather quantitative basis for how we are going to carry out this program and how it will evolve in the future.

Jean-Philippe Deschamps: At this stage you're still not talking about specific projects. You're talking about just how fast and where that whole area is going, which applications will emerge, etc.

Craig Tedmon: Sure. For example, our air pollution control plan says that we are going to develop technology that will capture particles of a certain size with greater efficiency than can be done today.

Richard Granger: So you're actually building a road map of technological goals?

Craig Tedmon: Absolutely, yes. And the budget is what's going to happen in 1994 or what's going to happen in 1995 along this road map. The program managers have the budget responsibility. They make their presentations to me and my colleagues for their budgets and then they get the money. The 15 program managers get the money, not the six research directors running our laboratories in six countries. The money goes to the program managers, and they allocate the money where the resources are.

Jean-Philippe Deschamps: Who are these program managers? Are they the most experienced managers, or the broadest thinkers in the lab, or could they be pure researchers?

Craig Tedmon: Typically they have very strong technical backgrounds and quite a few years of experience, although we've got some quite young people who have surprised us very positively by how well and how quickly they've come along. We select the people who have the kind of competence necessary to manage the program – plus the skills to manage a program in several countries.

Jean-Philippe Deschamps: So the program manager is really a line manager.

Craig Tedmon: Yes, and not just in one country. The team may be multinational.

Jean-Philippe Deschamps: How do the project managers work alongside the directors of the research centers?

Craig Tedmon: That is the matrix situation. The corporate research director has the primary responsibility for the people in his laboratory.

Jean-Philippe Deschamps: How do the business managers, the segment managers, and the business area R & D managers participate in the strategy/technology plan? Is it through the senior technology officer who participates in the program management?

Craig Tedmon: Yes, participation is primarily through STOs, but it varies. For each program we have a steering committee, which is usually chaired by the STO directly concerned.

For our four segments, we have five STOs. One segment has two STOs because it's so big. On average, each STO chairs three steering committees.

Also, all four segment managers are strongly interested in technology. How they manifest that interest depends on their personal styles. One of them in particular has very strong technical interest. I find that he often knows more about what's going on in a particular area of my corporate research than I do, and that's good.

Richard Granger: How are the business segments connected to the corporate research centers?

Craig Tedmon: The transportation segment is an interesting case because it works with almost all the programs in corporate research. They have identified a person in each corporate research laboratory to act as their liaison for that laboratory. But that approach is unique to the transportation segment. In many of the corporate programs, 95 percent of the work is for one segment only. In that case, you have a direct dialogue between the program manager and the segment's R&D manager or senior technology officer.

Richard Granger: So in those cases you avoid special liaisons or gateways?

Craig Tedmon: You should avoid gateways as long as you can. The best thing is to let the people involved talk directly to each other. Any gateway splits that responsibility. It can create misunderstandings and distrust.

Jean-Philippe Deschamps: How often is the technology strategy updated?

Craig Tedmon: Every year.

Jean-Philippe Deschamps: So each business that depends on the outcome of a given program participates in an annual collective exercise with the R&D people involved to identify the updated needs and the updated technological possibilities. Out of that, you determine in what way, if at all, you have to change your technology road map for the coming years.

Craig Tedmon: Exactly. Our general objective is that as far as possible we want these strategic technology plans to coincide with the technology plans of the business.

Jean-Philippe Deschamps: Presumably the business technology plans are subsets of the larger strategy?

Craig Tedmon: Yes, and indeed they should be. It's been my experience, contrary to folklore, that in fact business executives often have the longest-range perspective of anybody in the company. The folklore says that the corporate research center must take the long-range perspective because the business people are involved in the day-to-day activities and when you get a down cycle, the businesses cut back their costs and there goes your business laboratory and so forth. So you have a corporate laboratory to safeguard the future. But my experience in three companies in three countries in quite different industries is that that just simply isn't true. In fact, business people have a very good long-range perspective.

Richard Granger: Do you involve business people in the technology plan reviews?

Craig Tedmon: Always. When we do technology planning, the business people have to be the major contributors to it. They know what the business strategy is. They're the keepers and the developers and the owners of the business strategy. That's a process that they own to which we contribute. We take information from that process to establish a process we own, namely, the planning of our corporate technology research.

Richard Granger: You do that multinationally. Those strategic planning sessions must represent a number of countries on several continents.

Craig Tedmon: Indeed, they do. And we also have other inputs. In one case where we're developing a new process technology, we've come along to the point where we say, „OK, we've got a pretty good handle on the technology. We've talked to business people and they're very supportive. Let's go one more step. Let's go out and talk to customers.“ In this case, we sent people from our research laboratory along with the business managers and salesmen out to talk to a dozen customers. These kinds of inputs can have a substantial influence on the way you develop technology.

Richard Granger: Is it established practice to have corporate research staff go out to customers?

Craig Tedmon: No. It's only in the last few years that we've done this on an even partly systematic basis, but it's something we're pushing very, very hard.

Richard Granger: How do corporate research staff build links with the businesses?

Craig Tedmon: We begin to perceive that we have, from the corporate research perspective, two levels of customers: ABB'S external customers, and our immediate customers.

Jean-Philippe Deschamps: Are the latter internal businesses?

Craig Tedmon: The latter are engineers or whatever, and what is provided to these internal customers can be a report, but in best cases is an actual body. The internal customer gets somebody, because as the saying goes, you transfer technology with a pair of shoes. If you want to transfer the technology, transfer the person. That's absolutely far and away the best way to do it.

So the first step is to build strong bridges and relationships between the people in the corporate research group and the group technical community, which is 10 times bigger than they are. The group technical community includes elements of the operating businesses, as well as sales and marketing. So in the last two years we've put in place a very aggressive job rotation process. We try to do this in a way that's appealing and interesting and not threatening to the scientists. When I was at General Electric at one point in my career, I was told to take a job in operations. Well, that was fine for me. I'd been 16 years at GE at that time and had achieved a certain degree of professional stability and maturity and so while it was a bit – threatening is too strong a word – it wasn't a really scary experience.

I'd like to get our researchers to gain operating experience long before they've been in the corporate research center 16 years. That's far too long. So we put in place a job rotation system that provides opportunities for researchers to work in an operating business for periods of time from a few weeks to half a year and then return. They always get a return ticket.

Richard Granger: That's guaranteed before they go?

Craig Tedmon: Yes. And we manage these rotations so that they don't cost the people in the business anything. We pay for it ourselves out of corporate research. It's a relatively trivial expense. For the longer rotations, we transfer the employees' families. That may seem extravagant, but when you look at the absolute cost, it's not very much and it helps to make the program attractive.

Jean-Philippe Deschamps: Do you find this works better in some countries than in others?

Craig Tedmon: I haven't seen any problems. We have Norwegians going to Finland, Italians going to the United States, Swiss going to Sweden. Our job rotation program is all over the world. I don't know exactly, because I don't keep track of it on a day-to-day basis, but my rough guess is that more than 10 percent of all of our scientific staff have been involved in job rotations.

Jean-Philippe Deschamps: What do you see as the key challenge of operating a multidomestic multitechnology corporation?

Craig Tedmon: The answer is communications. People communicate with words that have different meanings. If you talk to somebody from Sweden about „ownership“ of a technology in the metaphorical sense in which we've been using that word, he or she probably will not understand what you mean. Whereas an American will understand immediately. Every single meeting, every communication involves words that have different meanings in different countries. So communication is never simple. And there are also real cultural differences. They may be less obvious than language differences, but they are real.

Richard Granger: Do you therefore look particularly for program managers who are or can learn to be sensitive to those differences, and who have the ability to adapt their management style to their audience?

Craig Tedmon: Yes. And I guess probably the single most important criterion – and here's where we're far from successful, just because of the nature of human nature – is to have patience and understanding, because there are so many opportunities for misunderstanding and suspicion. Too often, the latter arises just because words don't mean what we think they mean. But people who are reasonably sophisticated about cultural differences, and who are also patient and skillful at communicating, stand a reasonably good chance of managing a multinational, multicultural R&D effort.

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