The Industrial Research Institute—From War to Peace

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Roots of IRI

It was inevitable that there would be an IRI. Americans seem to take comfort in association. Find three people with common interests, preferably intellectual and social, and there will soon be a monthly lunch—perhaps a newsletter—in due time, an annual conference and surely some form of journal! The early signs of such activity were visible for the growing practice of U.S. industrial research in the first quarter of the 20th century. This “new” activity benefitted very greatly from the scientific foundation built up by European institutions before 1900 and for the experiences of those European companies that had already established technical units within their organizations.

The earliest U.S. industrial laboratories appeared at the start of the new century with GE in 1900, DuPont in 1902, Kodak in 1913, and Bell Telephone Laboratories, “to counter the threat of radio,” in 1911. There were others, smaller, perhaps less technically-based, but extending to commodities and consumer industries of all sorts. More than enough for a club, but there has to be a catalyst, a spark, for action. In fact, there were several. The first was World War I.

U.S. involvement in WWI was limited to 1918. There were a number of problems, chemical in nature, but also in communications and transportation, and the U.S. government called on specialists from industry and universities to help find solutions. These military requirements brought together the senior technical officers of many of the relatively new industrial laboratories. After the war, the personal relations developed in the course of working on these common problems led several of the individuals to begin meeting for lunch on a regular basis.

Wanting to formalize these meetings, Charles Reese, Director of Research for E.I. DuPont de Nemours solicited the interest of Robert Yerkes, head of the Research Information Service of the National Research Council (NRC), the research arm of the National Academy of Sciences. He hosted a dinner at the Engineers Club in New York on February 25, 1923. That meeting, attended by invited industrial research executives, formed the organizing event for a new club called the Directors of Industrial Research (DIR). This group planned to schedule monthly luncheons, usually with an invited speaker, and arranged periodic laboratory visits for the membership. The intent was to exchange thoughts on research, or any other subject of interest.

The DIR had no staff, no budget, and unpaid officers rotated annually. The principal duty of the treasurer was to collect payment for lunch at each meeting! Meetings were in New York, often at the Chemist’s Club and in later years at Kodak Company offices. Its principal purpose was to establish and strengthen cordial relationships, and it worked.

Its relatively small membership represented for many years more than 60 percent of the industrial R&D in the U.S., predominantly the large corporations of the Northeast. Its members in the earliest years included the names of giants in the history of industrial research in the U.S., perhaps globally. Among these was W.R. Whitney of GE, F.B. Jewett of Western Electric (ATT), C.F. Kettering of General Motors, C.E.K. Mees of Eastman Kodak, Charles Reese of DuPont. The DIR was active into the mid-1990s, but the modern world of industrial research has made it difficult to accommodate leisurely, thoughtful and informal discussions among the top
research executives of its large global corporations, and there is no reason to believe that this is unique to the United States.

During the 1930s, more companies invested in corporate laboratories; this expansion was in a wide range of industries throughout the mid-west and West Coast. Although DIR still attracted the top executives of the largest companies, it could not really represent the newer entrants. At the same time, a more formal type of organization of industrial research managers was being proposed by Maurice Holland, then Director of the Engineering and Industrial Research Division at the NRC. Holland was obviously aware of the establishment of DIR. While he appreciated the successful creation of an informal network among the senior research executives, he was also deeply concerned about the opportunities for a more active role that all research managers could play in increasing the effectiveness of industrial R&D.

Holland solicited the support of both industry and interested government agencies. The DIR served as a starting point for a broader program that might consider addressing policy issues and be more active in disseminating knowledge about industrial research. Holland had worked on details of structure and activities for such an organization. His proposal gained general acceptance in principle, but he ran into many questions about developing some form of official status for it. That was the situation at the end of 1937.

Meanwhile, many in the U.S. were increasingly and deeply disturbed about the situation in Europe. Despite a significant pacifist movement, Americans in general believed that we should enter the war willingly if Poland was invaded or we would end up having no choice at some later date and under less favorable conditions. The technical community was likely split along similar lines. Significantly, one man, Vannevar Bush, former Vice President of MIT and then President of the Carnegie Institution in Washington, DC, had become the unofficial science adviser to President Franklin Roosevelt.

Bush was strongly convinced that the U.S. would have to enter the war and that his mission was to get the entire scientific and technical community—government, university and industry—prepared and organized to play a critical role. He was in a strong position to influence the levers of government as well as work closely with the academic community. Though he was familiar with industrial practices and leaders (he founded Raytheon), he did not have a convenient mechanism for communicating and working with industry in any organized manner.

At that point, Holland had the occasion to meet Bush and present his vision for a new organization that he knew was acceptable to industry, based partly on the success of DIR. Within months, early 1938, the NRC issued a charter establishing the Industrial Research Institute as an arm of its administrative body.

**Early Development of IRI**

The DIR was a purely private club of individuals. IRI, however, was a formal public organization with private corporations as members, operating under the auspices of the NRC. In 1945, IRI separated legally from the NRC but retained its close relationship. At this time, IRI was incorporated as a nonprofit membership organization in the State of New York.

At its first organizational meeting on February 25, 1938, fourteen companies became the initial members. By 1944 there were 70 member companies. IRI was growing steadily, but with some
losses as companies merged or simply left. In 2005, IRI accepted government laboratories as members and, as of 2012, had approximately 200 overall member companies and labs.

With funding coming from member dues, it became clear to the membership and board of directors that those dues were set to cover administrative costs—office and small staff—but that any studies or specific actions taken would depend on special fees for that purpose (for example, an annual conference) and the voluntary participation of the member company representatives. Therefore, IRI and its ambitions had to grow together.

World War II, and the period of recovery which followed it, obviously occupied the first decade of IRI’s existence. To the best of my knowledge, there were no formal requests by government for IRI to participate in any major activity as an organization. However, there were countless calls for industry technical managers and experienced scientists and engineers to serve on committees related to the war effort. There is no doubt that Vannevar Bush and his aides made good use of every industry contact to staff these committees and to arrange for cooperation when necessary with government and university R&D programs. The direct effect was to leave little time for extracurricular activities such as IRI. The indirect effect was the strengthening of informal networks and working relationships between industry R&D managers and their colleagues in government and universities.

Still, even with the stress and demands of war, IRI did develop the basic structure that would stay reasonably constant for many years. There was an annual meeting of all members which evolved into semi-annual events, one in the fall and one in the spring. Incidentally, the term “members” is used here loosely. The “members” of IRI were the corporations, but the participants in IRI activities were two: the official voting representative and alternate representatives from each company, or their own designated alternate if the voting representative was not able to attend.

The meetings were not open to the public, but the representative could always bring one or two others from the company who might have a particular relevance for the subjects being discussed. Each additional representative paid the required meeting fees. As the semi-annual meetings grew in size, meeting fees became a significant part of IRI’s total income. Attendees at semi-annual meetings were encouraged to bring their spouses, for whom a separate fee was charged. This unquestionably added to the personal relations among the representatives, particularly those who attended regularly over a period of years.

The semi-annual meetings took on other interesting features. Almost all the speakers for the various sessions were from the member companies. This was in keeping with the goal of learning from each other and building professionalism in research management. Distinguished guest speakers were brought in once IRI revenues improved. Their expenses were paid, but no honorarium was ever involved. Furthermore, there would normally be a modest number of guests invited from government and academia, first to develop relationships, second to recognize leaders from local institutions.

In due course, a symbol of both maturity and improving finances, IRI launched its own journal, Research Management, in 1958. It changed its name in 1988 to Research-Technology Management (RTM) as part of the 50th anniversary of the founding of IRI. Initial sources for articles were the presentations from the semi-annual meetings, which have continued to come from authors within the member companies. As the journal became identified with practices of
industrial research management, it attracted and accepted articles from practitioners and scholars from many other institutions and countries.

RTM maintains a deserved recognition as representing inputs largely from practitioners within industry, who are also likely to be its major audience. The Maurice Holland Award was established in 1982 and has been given annually for the outstanding paper of the preceding year. This recognition is in hope that it will stimulate the creative minds within industry to articulate their ideas and experiences so that others may learn from them.

**Themes and Structure: 1950’s through 1990’s**

With the war over, IRI then began to develop as part of a changing but relatively stable industrial environment. As we look back over 50 years, though, change has indeed been considerable and even dramatic. The interests of industrial research and its priorities varied over any 10 year period, and that in turn affected the agendas and the structure of IRI. Some sense of these changes can be obtained by reviewing the programs for the semi-annual meetings and the articles published in *Research Management* and later in RTM.

There seem to have been a number of eras that characterize industrial research after 1950. There are no sharp separations between these periods, though, and any one period still has activities that properly should fall in another. But each micro-era, the 1960s or 1970s for instance, came with its own emphasis among member companies and these eras differed from one another in distinct ways. As a result, different committees of IRI were formed and kept active that reflect those interests over time. Consider the principal periods described below.

**Period I**, beginning in the 1940s and running through the 1950s, may be called “Intra-Laboratory” or, perhaps, the period of “bread-and-butter” concerns. The issues touched on in this period came from within the laboratory and focused on the proper management of lab issues to improve the effectiveness of lab operation. There were discussions of “dual-ladder” career paths so that individuals who preferred careers in active research could be rewarded without having to take on management responsibilities. Another topic was lab design to allow for communication across disciplines, along with laboratory organization, i.e. by discipline or by end product. And of course “how to measure research effectiveness” was present in every period. How the ratio of technicians to professionals would affect the cost structure for different industries, but still play a role in resolving occasional shortage of professionals, was also a common issue.

**Period II** was the “Intra-Corporate” era (1950s-1960s). As industrial research grew larger, the laboratory director was then a Vice President and/or corporate executive, so his or her concern was then with the interactions between R&D and the rest of the company. And if that was his or her concern, then it became the concern of IRI. For instance, questions about sufficient linkage between R&D and marketing in the selection and priority of projects became common. Was there enough involvement with manufacturing to prepare for a successful transfer of R&D results? Were the R&D plans for long-range programs compatible with corporate strategy for its future growth? In short, what must corporate R&D do to function effectively as part of a corporate team?

**Period III** (1960s-1970s) is characterized by “Government-Industry” concerns. The end of WWII did not mean that government went away. R&D within government labs expanded with time, and so did the various committees that desired representation from industry. In addition to such public-private interactions, there was a marked increase in issues of a regulatory nature,
most notably in energy and environment. These often required technical inputs to produce effective and rational policies in those areas. Through much of the late 1960’s and early 1970’s, for instance, I traveled to Washington, DC, in an official IRI capacity roughly once a week in order to discuss technology policy issues. Eventually, in 1989, IRI moved its offices from New York to the DC area to better accommodate such conversations.

These interactions between government and industry were reflected in the programs, journal articles and in the committee structures of IRI at the time. A Committee on Government Relations (later called the Federal Science and Technology Policy Committee) was established in the early 1970’s to provide a liaison mechanism with government agencies and for years became the largest and most active IRI committee. IRI nominated people to serve as one-year interns with several agencies, including the Office of Science and Technology Policy (OSTP) in the White House. It also nominated industry representatives who served temporary appointments as Scientific Attachés in the London and Paris embassies. Such quasi-official relations have lessened today but there is still a wide network of interactions on an individual basis between IRI staff and diverse government agencies.

Period IV, which runs from perhaps the late 1970’s all the way to the present day, was marked by the steady increase of numerous mechanisms for cooperative R&D. These included joint R&D projects between companies, strategic alliances that included both R&D and commercial relations, industry associations—such as Sematech for semiconductor research—and university research centers with industry support and participation. These all provided new approaches for planning corporate R&D since companies were no longer limited by their internal resources. It also gave the senior technical officers more strategic responsibilities. Again, these cooperative activities provided increasing subjects for both RTM articles and conference discussions.

Finally, for Period V (late-1980s-present), I use the word “Globalization,” but I do so reluctantly because there has in fact been a steadily expanding role in international aspects of corporate R&D even before the 1950’s, and a number of IRI members have had labs in Europe for many years, such as GE, P&G, IBM, among others. In recent years, the number of these laboratories has expanded, both in Europe and many more in Asia. Researchers in these international laboratories often develop linkages with colleagues at universities and institutions in the host country, and thus the laboratories serve to expand networks for the dissemination of technical advances in both directions. Increasingly, the R&D operations of U.S. corporations must be aware of technical advances globally. IRI activities that promote these contacts and networks play an important role.

During these later years, as the linkages and responsibilities of industrial research became more complex, there was a shift in many large companies from large centralized labs to more specialized decentralized labs. This can be geographical, e.g. foreign laboratories, or by product line or other function. Such decentralization can raise management issues that have therefore become subjects of discussion at IRI’s semi-annual meetings and in RTM articles.

Impact of Changing Interests on IRI

Internationally, relations have been established and encouraged with comparable organizations outside the U.S. The most active of these over the years has been interactions with the European Industrial Research Management Association (EIRMA). This began with the organizational period for EIRMA when the Executive Director of IRI, Charles Worthington, spent time in Europe to assist EIRMA’s founders, drawing upon IRI’s own organizing experience. Several IRI
representatives made a point of attending early EIRMA conferences, and EIRMA representatives were invited to IRI’s semi-annual meetings. There was even an exchange of the Administrative Assistants from each organization for a short period in order to give each some familiarity with the other group’s procedures.

As always, cordial relations developed between individuals from the two organizations. Such developments have always characterized IRI, and the activities of EIRMA and comparable groups in Japan, Canada and elsewhere have expanded these developments globally. Those ties have played an important role in the comparative evaluation of national science and technology policies and in the establishment of linkages with companies and institutions of other countries.

Relations between IRI and EIRMA were further enhanced by a program of Joint Study Missions during the 1980’s. Five were scheduled from 1982 through 1987. In each case, a group of roughly 50 representatives—25 each from IRI and EIRMA—would hold discussions based upon visits to labs in the host countries. The first trip scheduled for 1982 was canceled due to poor economic conditions, but the following four in 1984, 1985, 1986, and 1987 took place as planned. The second mission (the first one that actually took place) was from IRI to EIRMA, and included trips to ICI, Shell, Philips, Bayer and Hoechst. The last mission, in 1987, was to California, and featured visits to Genentech, Xerox, Hewlett-Packard, Stanford Research Institute, Rockwell, Rocketdyne, and Walt Disney Engineering (including Disneyland!).

The expanding concerns of industrial research—lab to company to nation to world—added greater significance to an objective that had been neglected in the early years of IRI. This is the desire to generate more knowledge about the nature of industrial research and to disseminate that knowledge to practitioners and scholars. IRI’s finances did not allow an internal staff to conduct studies, and the member representatives were not successful at implementing a specific study over a period of time. One attempt was made to conduct a study funded by a government agency, permitting staff assistance for that purpose, but the “successful” study lost money!

Finally, an approach was developed which is today one of the more productive programs of IRI. A Research-on-Research (ROR) Committee was established to initiate and conduct a range of projects. Through this program, a research proposal is submitted by a member representative for approval by the Committee. Whether initiated by an outside individual from a university or by a government agency, an IRI representative is the one who presents the proposal to the ROR. Every research proposal is then led by an IRI representative to carry out the work in cooperation with the original proposer.

The proposal is then reviewed by the ROR Committee. ROR meets physically once a year and is open to all IRI members. The 2012 meeting in Miami, for example, attracted over 100 registrants. There are also sessions of the ROR at the regular semi-annual meetings of IRI. Proposals and the progress of ongoing projects are discussed at each meeting.

Topics of interest at ROR meetings have ranged from portfolio management and evaluation to Radical Innovation to metrics for the “Fuzzy Front End” of innovation and more. The various ROR groups present research and findings on a rolling basis. Some of the current projects underway include a project called “Accessing Internal Knowledge” which is attempting to identify ways in which organizations capture and disseminate tacit knowledge held in the minds of their veteran employees to others throughout the company. Another group is addressing the challenges and best-practices of managing virtual teams.
In any given year, about 15 projects are in progress. Roughly a third of these projects run 6 months and address narrow questions; another third are projects which run 12-18 months; and, another third are longer term projects of 2 to 4 years. This approach ensures that ROR research is tied to practical needs and operations of industry, and strengthens relationships between the corporations and universities participating. Results are publishable, and hopefully improve the understanding of industrial research for a wide constituency.

Finally, a separate activity, but one which serves similar practical purposes as ROR, is the collection and analysis by IRI of an Annual R&D Trends Forecast. This is certainly not as detailed as the NSF Science Indicators, but is based upon a poll of IRI members. It is timely and reasonably reliable in identifying year-to-year changes in industries and their planned R&D expenditures for the coming year. Tracking these changes allows IRI and its membership to have a better grasp of the changes happening in the global R&D environment and then adapt accordingly.

**Changing Nature of IRI**

What industrial research is, and what it contributes to economic growth, have not changed in any fundamental way. However, the world around us has changed much in the past 30 or 40 years, the factors that determine the subject matter for corporate laboratories have changed, and the people who manage and apply industrial research have seen their responsibilities increase greatly. It is hardly surprising that an organization intended to assist these leaders and their home organizations must change with them. IRI has done just that and, presumably, has attained a pattern of stability that will permit it to remain a valuable contributor to the process and value of industrial research.

In the formative days of IRI up to the 1980’s, roughly 50 years, the member company representatives were mostly the senior technical executives of the member corporations. They are the ones who attended the semi-annual meetings. IRI was able to retain many of the features of a private club that encouraged the development of good personal relationships. The themes of the meetings, interactions with EIRMA and other non-U.S. associations, and the informal discussions at IRI activities were all compatible with the broader responsibilities of IRI representatives.

After 1980, slow but noticeable changes took place. There was a decline in the participation of the chief technical officers in IRI affairs and at IRI events. That was surely a direct consequence of the greater responsibilities of the CTO in corporate management and strategic planning that had begun during the 1970’s. The drop in participation of CTOs increased the emphasis of IRI on the basic issue of improving the effectiveness of research management.

With the drop in CTO participation, IRI also experienced reduced attendance at annual meetings and a consequent drop in revenue. Two principal shifts in IRI operations resulted. The first was to admit organizations other than private companies which conducted R&D projects funded by their own resources and whose issues of research management would have much in common with traditional IRI member concerns. The second was to increase and/or develop services that would raise participation in IRI activities and programs. These services were focused on (1) information transfer and (2) education, partly in conjunction with the Harvard Business School and later with the Kellogg School of Management at Northwestern University.
IRI changed as it grew, and will continue to change. It initially grew with the traditional manufacturing industries that used and relied upon technical advances in the physical sciences and mathematics. Emphasis on the life sciences has increased sharply since the 1970s, but these are also associated with scientific advances in large laboratories. The management of this R&D activity, integration with other company functions, and networks for the needed global flow of information remain compatible with the mainstream of IRI activities.

However, there is one sector in the service industry that is adding rapidly to industrial R&D expenditures and changing the nature of our economic activity, but which at the moment has little association with IRI programs, principal committee agendas, or meetings. This refers to the large users and providers of information technologies (IT) such as Google, Facebook and their many competitors. These companies can launch successful business ventures based on the existing state of knowledge from advances in hardware and components.

Once in business, these growing companies engage in very extensive R&D that will improve their efficiency and performance. Google is expected to spend almost $4 billion in 2012 on R&D (according to Battelle’s 2012 R&D Forecast), and Facebook should be at the billion dollar R&D level by 2013. These companies are not members of IRI, nor are some of the large developers of systems and networks such as Oracle and Cisco, with planned expenditures of $4 billion and $6 billion respectively. Microsoft, with planned 2012 R&D expenditures of almost $9 billion, had joined IRI for a short period, then left.

We may only speculate as to why such organizations have so far avoided engaging with the rich offerings that IRI provides. Does the competitive structure of their business inhibit their interactions with other industries, for instance? Or is the answer much simpler, namely, that the rapid growth rate and mounting legal and privacy problems keep their company executives too occupied to permit taking time for activities outside the corporation?

If so, then IRI must find ways to accommodate the needs of these new, important and growing companies. Just as their technologies and methodologies will enrich the broader industrial R&D community by joining and participating with IRI members, so will the interactions with the mainstream of industrial R&D—represented by IRI—contribute to their operations and provide new growth opportunities. This will surely take time and experimentation. Both communities—mainstream and new—have much to gain.

It seems reasonable to conclude that IRI has now achieved a stable operating mode that can be a constructive contributor for today’s industrial research management ecosystem. If and when further change is called for, there is good reason to believe that IRI has the flexibility to change accordingly.