The founding of MRS—The rise of interdisciplinarity

Professional society broadens the boundaries

This article is based on remarks on the founding of the Materials Research Society (MRS) given at the 2015 MRS Fall Meeting during a special session in memory of the first president of MRS, Harry C. Gatos (1973–1976).

The idea of the Materials Research Society took flight in the rich milieu of scientific research during the post-World War II era, which had arisen from the tremendous technical accomplishments of US science and technology during the war, such as radar and the Manhattan Project.

Three pillars made up the research enterprise in that era, much as they do today. First, the role of the US government in research was profoundly reshaped following World War II. Vannevar Bush of the Massachusetts Institute of Technology (MIT) served, in effect, as the first presidential science advisor, heading the US Office of Scientific Research and Development, through which almost all wartime military research and development was conducted, including the beginning of the Manhattan Project. This was the first time the federal government had invested significantly in research and development.

After the conclusion of the war, Bush advocated for sustained federal support for the advancement of knowledge, which led to the establishment of the National Science Foundation (NSF) and a remarkable expansion of peacetime investment in scientific research by the US government* across agencies, including NSF, the Department of Defense (DoD), the Atomic Energy Commission (forerunner of the Department of Energy), and NASA. The funding agencies generally aligned their programs with traditional disciplines—physics, chemistry, metallurgy, and the like—so it is not surprising that the research they supported also had a strong single-discipline flavor.

Universities and professional societies were similarly one-dimensional in their disciplinary outlook. Universities retained their existing departmental structure, and most professors responded to the discipline-based funding agencies as expected—by proposing single-discipline research projects. Professional societies catered to this environment by providing meeting and publication venues for reporting the types of work supported by the federal agencies.

Things were rather different in industry. The 1950s and 1960s were the heyday of the industrial research laboratories—Bell Labs, IBM, General Electric, DuPont, RCA, and others. The work of these laboratories, often very fundamental in nature, focused on addressing particular problems faced by the industry supporting them. The nature of these challenges typically required teams with expertise in multiple fields for resolution.

It is not difficult to see how a mismatch developed between the needs of industry and what was provided by the government, universities, and professional societies. Companies needed research relevant to their technical challenges, that is, the advancement of the frontiers of knowledge that crossed and wove together different disciplines, in contrast to the research supported by federal programs built and executed along disciplinary lines. Furthermore, industry, as the major employer of students produced by the universities, wanted to hire students trained in the art and science of working across disciplinary boundaries. Such training was not typical of students supported by discipline-based federal funding.

Some university researchers saw the need for interdisciplinary research, but found that there was no infrastructure to support such work. Obtaining government funding was essentially impossible since it fell through the cracks of the agency structure, and universities did not typically foster cooperation across departmental boundaries. Industry, of course, recognized the need for a mechanism to surmount these barriers. Bell Labs and General Electric, in particular, strongly encouraged government agencies to develop mechanisms to support interdisciplinary work; some interdisciplinary programs began as early as 1960 (the DoD Advanced Research Projects Agency Interdisciplinary Materials Research Laboratories). Unfortunately, these efforts tended to be layered on top of discipline-aligned institutions, both in the government agency and the university, so that the "interdisciplinarity" tended to die as soon as the funding allocated to the special program died.

The dearth of venues for reporting research results and discussing them with like-minded colleagues provided an additional challenge for those performing interdisciplinary research. This situation led to efforts in the late 1960s to broaden existing professional societies, by increasing the interdisciplinarity of the programming and by even more radical means, such as changing society names to make them more welcoming to research across a breadth of disciplines. These efforts failed, indicating the need for a solution outside the bounds of existing institutions.

This is when a set of visionary individuals saw a need and had the drive, capability, and wisdom to create the future. A number of individuals and groups in both universities and industry reached a consensus on the need for a new interdisciplinary professional society for materials since continued attempts to broaden existing organizations were futile. This realization led, in 1969, to a "Colloquy on Materials" during which a core group of organizers, including representatives from Case Western Reserve University, MIT, The Pennsylvania State University, Bell Labs, General Electric, Xerox, RCA, and NSF joined forces. The

* "Science the Endless Frontier," https://www.nsf.gov/od/lpa/nsf50/vbush1945.htm.

fact that this group had roughly equal representation of industry and academia was important and proved to be a defining feature of MRS for many years. This core group, with small modifications over time, was heavily invested in creating a new paradigm. Not only did individuals spend countless hours as volunteers for the cause, they also made financial contributions to enable the full gestation of the nascent organization.

Four years later, in May 1973, the Materials Research Society held its inaugural meeting at The Pennsylvania State University. The topic was appropriately interdisciplinary: "Phase Transitions and Their Applications in Materials Science." Immediately, 215 individuals signed up to become members of the Society, and nearly 300 attended the meeting.

The program from that meeting revealed that the core of today's MRS was already fully envisioned, as documented by the "Purpose" of the Society: "The Materials Research Society will serve and promote the common interests of those people involved in the preparation, characterization, design, and utilization of materials. Particular emphasis is placed on research activities involving the interfaces of many scientific and engineering disciplines. This is a professional society specifically designed to appeal to a community of scientists and engineers trained in a broad spectrum of fields: physics, metallurgy, electrical engineering, ceramics, chemistry, polymer science, engineering mechanics, chemical engineering, etc."

Bolstered by a successful technical meeting and a compelling purpose, MRS began to mature and quickly took on many of the trappings that we still consider to be identifying features of the Society. The first officers were elected in 1974 and, continuing in the pattern of the Colloquy on Materials, included roughly equal representation of industry and academia. The original slate of officers included a newsletter editor, the first issue of which was published in 1975. This publication was the progenitor of today's *MRS Bulletin*, which began in 1982. The Von Hippel Award, representing the Society's highest honor, was first awarded in 1977. And in that same year, the annual meeting moved to Boston, where the Fall Meeting has been ever since.

1984 Materials Research Society Fall Meeting.

From the beginning, the program at each MRS meeting has been built around problem-focused symposia and has included sessions on education, reviews, and plenary sessions. In the late 1970s, the Society transitioned from a "nucleation" to a "growth" phase. Society membership in 1977 was about 300, not much more than it had been at the inaugural meeting in 1973. Two symposia that began in 1978 helped in the transition to a new state: "Laser Annealing" and "Scientific Basis for Nuclear Waste Management." MRS became THE go-to meeting for these topics and, partially as a result, the membership reached about 1000 by 1979. Of course, many other topics, ranging from high-temperature superconductors to nitride semiconductors, have similarly "grown up" within MRS, and by 1990, membership exceeded 10,000.

MRS recognized early on the global nature of materials research and facilitated the establishment of the European MRS (E-MRS) in 1983, the first of many international organizations built on the interdisciplinary foundation of the Materials Research Society. And MRS took another important step toward becoming a "full service" society in 1986 with the founding of its first archival journal, the *Journal of Materials Research*.

As they say, the rest is history. It is appropriate to conclude with the words of Harry Gatos, the first MRS President on the occasion of the 40th anniversary of MRS: "The founding and operation of MRS was the culmination of my 10 years of frustrated effort in searching for a professional home (old, renovated, or new) for the young, homeless materials science. The leaders of the existing materials societies strenuously resisted accepting that materials science existed outside the materials they dealt with, be they metals, ceramics, or polymers, the Founders of MRS were just a small but 'driven' minority with a vision of a 'materials-blind' materials society." □

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1995 MRS President

More readings of interest

- G.A. Oare, *MRS Bulletin* **38** (11), 958 (2013), doi:10.1557/mrs.2013.274.
- G.A. Oare, *MRS Bulletin* **40** (8), 696 (2015), doi:10.1557/mrs.2015.186.
- *MRS Bulletin* **18** (9), 73 (1993), contains a special section celebrating the 20th anniversary of the Materials Research Society, including a set of articles written by former MRS Presidents.
- R.W. Cahn, *The Coming of Materials Science* (Elsevier, Philadelphia, 2001).
- J. Gertner, *The Idea Factory: Bell Labs and the Great Age of American Innovation* (Penguin Press, London, 2012).