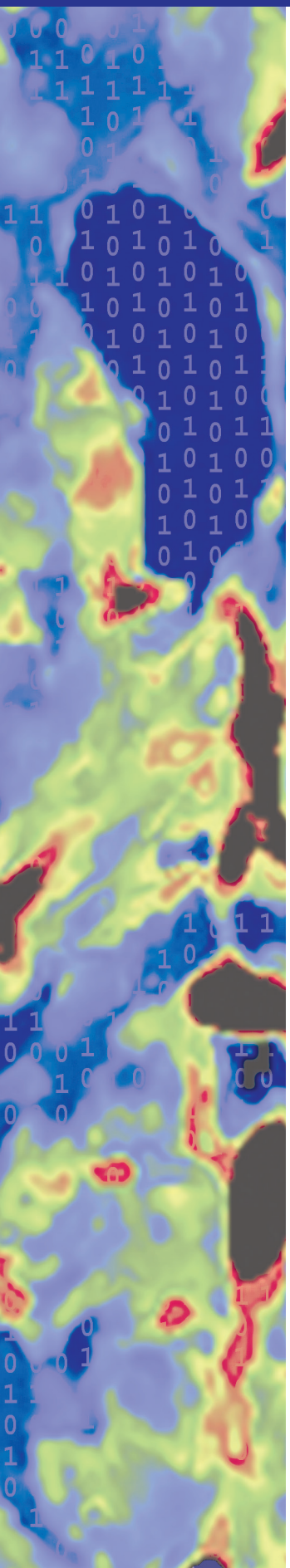

A Call for Radiology-led Innovation

Amine Korchi, MD

Radiologists owe a large share of their success to non-radiologists.

From the discovery of X-rays by Wilhelm Röentgen in 1895 through the introduction of CT and MRI in the 1970s and '80s, radiologic innovation was characterized largely by advances in imaging hardware and operating systems and essentially driven by physicists, chemists, and engineers.

Radiologists were mostly users of these breakthrough technologies and contributors to their clinical application.

But since the introduction of radiology information systems (RIS) and picture archiving and communication systems (PACS) during the '80s, radiologists and technologists have gradually become more involved in the development of these tools, which are highly physician-centric and strongly intertwined with clinical workflows.

In 1980, American academics and private hospitals created the Radiology Information Systems Consortium (RISC), whose aim was to develop a new RIS that would serve the needs of medical imaging. The RISC issued a request for proposal seeking help from an industrial and technical partner. The Digital Equipment Corporation (DEC), which already had earned a reputation for its innovative technology, funding, industrial know-how, and close collaboration with user groups and healthcare professionals, won the contract.

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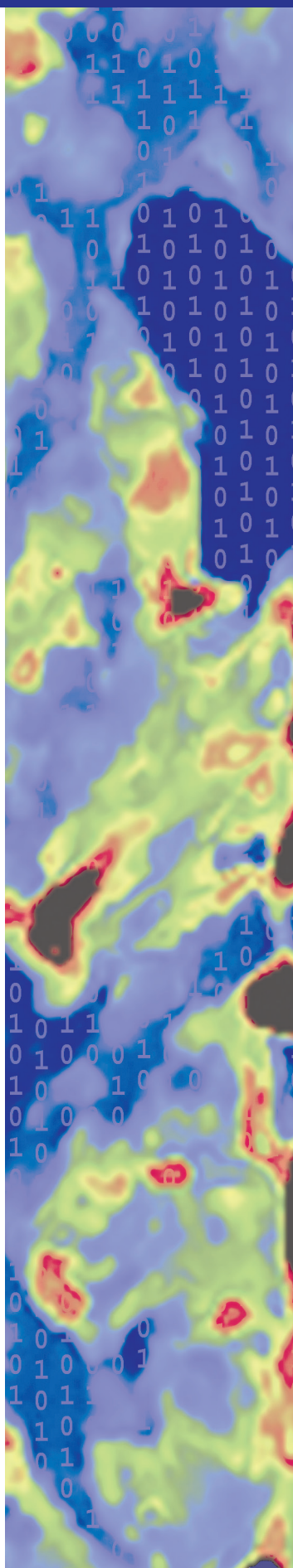
The radiology-led collaboration between the RISC and DEC went on to open the way to the development of new RIS software that earned fast adoption in radiology thanks to its ability to address the specific needs of medical imaging practitioners.

In a way, DEC is the ancestor of today's startups. The company was founded in the 1950s by two engineering students working at the Massachusetts Institute of Technology's Lincoln Lab who believed that transistor-based computers would revolutionize the corporate world with smaller, faster, cheaper, and more efficient machines than the bulky and expensive IBM computers available at the time.

While looking for investors to fund the company's early stages of development, the two entrepreneurs were advised to avoid using the word "computer" in their presentation because an article had just recently appeared in *Fortune* magazine stating that no monetization should be expected from the nascent computer industry.

Yet, in 1957, a private equity firm named ARD made a $70,000 equity investment for 70% ownership of the newly formed company. DEC went public in 1966, became a Fortune 500 company in 1974, and was acquired by Compaq in 1998. It was one of the largest acquisitions in computer industry history, and DEC today is recognized as the first home run of venture capital (VC) funding.



One hand cannot clap; Collaboration is a sine qua non *to innovation.*

Nowadays, a wide ecosystem of VC-backed artificial intelligence (AI) startups is transforming the way medical images are produced, processed, and interpreted. But even though AI is recognized as the next driver of radiologic progress, the "killer" AI application with a viable business model in this field still has not been found.

In the previously mentioned collaboration between RISC and DEC, the breakthrough of the partnership lay in the fact that innovation was requested and guided by hospitals in order to enhance their workflows.

And because radiology AI research and development depends heavily on radiologist and technologist know-how, these clinicians have the legitimacy to become leading actors of the AI-based transformation by enabling development of truly useful solutions and improving capital spending efficiency.

To build a sound AI product in radiology, six prerequisites should be met: a clinical need must be identified with granularity, relevant data must be queried and collected, medical images must be prepared and annotated, models must be validated and tested, user interfaces must be built, and software must be integrated into existing IT infrastructure and workflow.

Each of these steps requires deep domain expertise and clinical insights that are mainly in the hands of healthcare professionals. Therefore, it is clear that these stakeholders are best qualified to lead and orchestrate AI development in radiology.

Obviously, most medical imaging clinicians and professionals do not have the technical or industrial skills to bring AI software to market. One hand cannot clap; collaboration is a *sine qua non* to innovation. Partnerships with startups and manufacturers are the right approach, and while they are already forming, they are not headed in the right direction.

Today's most innovative ideas continue to emanate from startups. It is their AI engineers or computer scientists who knock on the door of hospitals to beg for data and insights, when it should be healthcare professionals knocking on their doors and looking for their expertise.

For the sake of more constructive and useful outcomes, radiology departments and healthcare institutions should take ownership of the innovation process. They need to adopt the right mindset by identifying their own needs, auditing and preparing their own data, allocating protected time and resources to their own research and co-development, and most importantly, creating their own governance and frameworks to facilitate collaboration with the external world.

Moreover, healthcare professionals and institutions must educate themselves in the workings of the non-medical fields. A high-level understanding of AI technology will facilitate collaboration with technical and industrial partners; becoming familiar with innovation methodologies will enable them to take a structured approach to efficiently orchestrate innovation from ideation to product.

There can be no doubt: Without strong leadership from radiology in 2021 and the years to come, artificial intelligence will not be able to fully deliver on its promise to transform the field of medical imaging.