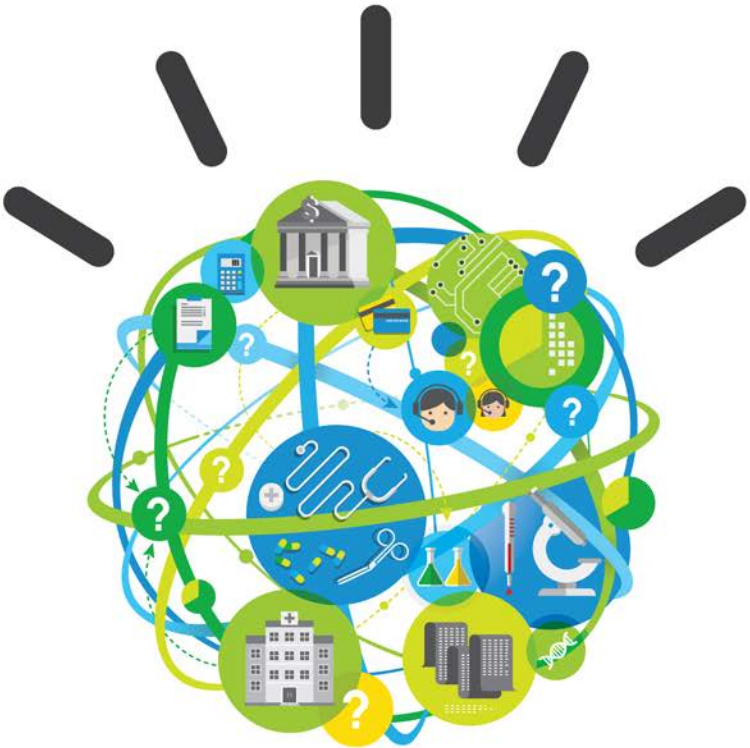

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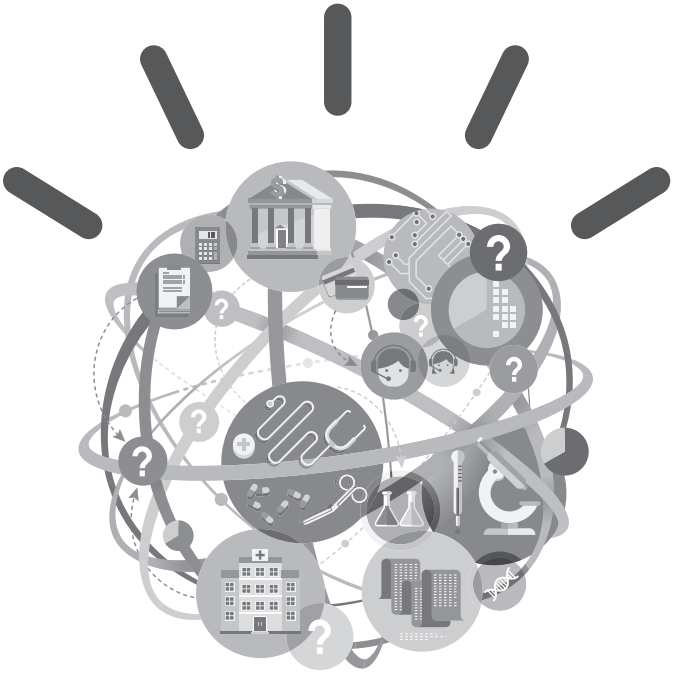

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PREFACE

John E. Kelly III

When I was a kid, my dad worked at General Electric's R&D lab in Niskayuna, N.Y. I would visit and watch him work with vacuum tubes, which looked like lightbulbs and directed electrical current in all sorts of devices, from radios and TVs to radar and computers. At the time, I didn't fully understand how vacuum tubes worked, but those visits inspired me to study science and, ultimately, to get two degrees in physics and my Ph.D. in materials engineering. I later came to realize that I had witnessed one of the important transitions in the history of technology. While my dad was showing me vacuum tubes, other engineers were experimenting with the vacuum tube's successor, the transistor, which ultimately ushered in modern electronics and personal computing.

Now we are at the dawn of a much bigger shift in the evolution of technology—a new era affecting nearly every aspect of the field. The changes that are coming over the next two decades will transform the way we live and work just as the computing revolution has transformed the