Deconstructing the iPad: How Federally Supported Research Leads to Game-Changing Innovation

Key Points

• The iPhone and iPad, and similar modern smart devices, are transformative devices that encapsulate a remarkable confluence of technologies: supercomputer-like processing capability; a sensor suite (cameras, GPS, microphone, compass, accelerometer) robust enough to know where the device is and what it's looking at; and an interface that is revolutionary in its ease of use.

• These technologies have enabled game-changing capabilities -- the ability to translate signs simply by pointing a camera at them, convert foreign speech into one's native tongue, tap into real-time networks that provide traffic information, or have at your fingertips access to all the world's information.

• Without exception, these technologies, and others like them, have their roots in early-stage scientific research and all bear the stamp of federal support.

• The iPad processor, as well as all the support and interface chips, was born out of work on the first integrated circuit at Texas Instruments and Fairchild in 1958; the GPS system that allows the iPad to know its location to a few feet was born out of early-stage physics research in U.S. universities in the '40s and 50's; and the touchscreen and multi-touch interface was born out of Defense-research in the late 60s and 70s and NSF-funded research in the 80s and 90s. All are examples of enabling technologies that are products of an enormously productive research ecosystem, an interplay of privately funded industrial labs, federally-funded university researchers, and federal labs, that produce a constant stream of people and ideas to drive American innovation.

• This early-stage research (also known as “basic” or “fundamental” research) in universities and federal labs does not supplant work done in industry. Early-stage scientific research has a number of characteristics that make it an appropriate responsibility of the Federal government and inappropriate for industry:
  • It often takes a long time before it pays off -- sometimes decades; industry is generally focused on the next product cycle or two;
  • It often pays off in unanticipated ways -- developments in one sector frequently enable advancements in others, often serendipitously;
  • It's difficult for industry to capture the benefit of early stage research because the results of that research, by nature, are available to everyone, including the competition.

• Federal support for early stage research is truly an investment with a history of extraordinary payoff -- in the explosion of new technologies that have touched nearly every aspect of our lives, and in economic terms, in the creation of new industries and literally millions of new jobs.

• The iPad isn’t a culmination of technology, it's a mile-marker on a continuum of innovation that is improving our quality of life, a continuum of innovation made possible by federal research. The federally supported research of today will drive the innovations that will change our lives in the years and decade(s) ahead.

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