Spark

The Government's New BRAIN Initiative: The Next Manhattan Project?

APR 22, 2013

Qualcomm products mentioned within this post are offered by Qualcomm Technologies, Inc. and/or its subsidiaries.

This month, President Obama announced the bold new BRAIN (Brain Research Through Advancing Innovative Neurotechnologies) Initiative, which challenges scientists to map the organ to better understand how we think, learn, and remember. The program brings to mind similarly historic R&D programs with the ambitious goal of taking on mankind's biggest challenges. While there are pros and cons to the Big Science concept, particularly in a time of budget belt-tightening, it's hard not be inspired by the audacious vision and the tremendous scale of these types of undertakings. Here's how the BRAIN Initiative will fit into our our picks for the government's most ambitious Big Science initiatives, all of which changed the course of history.

The Manhattan Project (1942–1947)

Goal: To develop and build an atomic bomb (in response to enemy threats)

Challenges:

- Solve a large-scale engineering problem, based on largely untested theories.
- Take laboratory research into design, construction, operation, and product delivery with great speed and secrecy.

Estimated Costs: About $2.2 billion over five years (which equates to $26 billion in 2013 dollars).

Key Players: U.S. Army Corps of Engineers with support from the U.K. and Canada

Benefits (according to the U.S. Dept. of Energy):

- At its peak, the project employed 130,000 workers.
- It not only helped bring an end to the Second World War, but ushered in the atomic age.

Legacy:

- As described by Stanford University Professor Timothy Lenoir and Marguerite Hays, "The Manhattan Project was the technological incubator for important Cold War electronics, computer science, military, and aerospace technologies."
- The U.S. Dept. of Energy cites the Manhattan Project as the organizational model behind the remarkable achievements of American "big science" during the second half of the 20th century.

The Apollo "Moon Shot" Project (1961–1973)

Goal: Land a man on the moon and safely return him to Earth within a decade.

Challenges:

- America's space program was in its infancy, launch vehicle technology was not well developed, and at the time of the announcement in 1961, only two people had actually been to space.
- An entire new space technology had to be developed; including orbital rendezvous, extravehicular activities, rocket-powered landings, and deep space navigation, among others.

Estimated Costs: Nearly $20.4 billion from 1959 to 1973. A 2009 NASA Symposium estimated about $170 billion (in 2005 dollars).

Key Players: NASA plus various industry and university contractors

Benefits:

- NASA estimates showed that for every dollar spent on the Apollo program, the nation received $9 in benefits from new technologies.
- Employed more than 34,000 NASA workers and 375,000 employees of contractors.
- Led to great progress in rocketry and aeronautics, and civil, mechanical, and electrical engineering.

Legacy:

- As noted on NASA's History Office website, understanding the management of complex structures for the successful completion of a multifarious task was a critical outgrowth of the Apollo effort.
- The Apollo program has been called the greatest technological achievement in human history.

Human Genome Project (1990–2003)

Goal: Map all the genes in human DNA (identify all possible sequences, create a database).

Challenge: The scale of the project.There are 20,000 to 25,000 genes in human DNA, made up of about 3 billion chemical base pairs (DNA building blocks).

Estimated Cost: $3.8 billion (about $300 million per year for about a decade)

Key Players: U.S. Department of Energy, National Institutes of Health (NIH), Wellcome Trust (U.K.), and scientists from 20 centers in six countries.

Benefits:

- The results of the Human Genome Project have allowed researchers to understand the blueprint for human life. For example, scientists have pinpointed a number of genes tied to common diseases such as diabetes and Alzheimer's.
- Knowledge of the variation of DNA and its effects can revolutionize the way doctors diagnose, treat and even prevent a number of diseases.
- As researchers learn more about the functions of genes and proteins, this knowledge will have a major impact in the fields of medicine, biotechnology, and the life sciences.
- The White House reports economic output of approximately $796 billion (about $141 for ever dollar invested).

Legacy:

- The project is described by the NIH as biology's equivalent to "the moon shot."
- While the list of examples where genomic analyses are providing answers or new therapeutic approaches to vexing clinical problems is growing, much basic research remains to be done to ensure a productive implementation of genomics for clinical care.

BRAIN Initiative (2013–2023)

Goal: Give scientists the tools they need to get a dynamic picture of the brain and better understand how we think, learn, and remember.

Challenge: According to Gregory Ferenstein at TechCrunch:

- The brain is arguably the most complex structure in the known universe.
- It consists of an estimated 125 trillion synapses, or the number of stars in 1,500 Milky Way galaxies.
- The brain itself has a storage capacity of roughly 2.5 petabyes (a million gigabytes), or roughly 3 million hours of recorded TV.

As reported by Chris Burns at Slashgear:

- The BRAIN Initiative will necessitate stimulation and recording of an unprecedented number of neurons, requiring real-time data processing.
- Estimated Cost: $100 million initially from the U.S. government, plus approximately $968 million from private-sector partners over a decade.

Key Agencies:

- National Institutes of Health (NIH)
- Defense Advanced Research Projects Agency (DARPA)
- National Science Foundation (NSF)

Key Partners:

- Allen Institute for Brain Science ($60 million per year) to focus on perception, decision making and action
- Kavli Foundation ($4 million annually) to focus on new imaging technologies
- Howard Hughes Medical Institute ($30 million per year) to focus on diseases and conditions

- Salk Institute for Biological Studies ($28 million) to focus on genes and neuronal circuits

Potential Benefits:

- New ways to treat, prevent, and cure brain disorders like Alzheimer's, schizophrenia, autism, epilepsy, and traumatic brain injury.
- Paves the way for advances in artificial intelligence.

Possible Legacy:

- Unprecedented cross-disciplinary scientific work in the nanoscience and neuroscience communities.
- Per New York Times reporter John Markoff, it aims to do for the brain what the Human Genome Project did for genetics, with the potential to revolutionize our understanding of the human mind.
- In the launch press conference, President Obama concluded, "We have the chance to improve the lives of not just millions, but billions of people on this planet."

Invention

Opinions expressed in the content posted here are the personal opinions of the original authors, and do not necessarily reflect those of Qualcomm Incorporated or its subsidiaries ("Qualcomm"). The content is provided for informational purposes only and is not meant to be an endorsement or representation by Qualcomm or any other party. This site may also provide links or references to non-Qualcomm sites and resources. Qualcomm makes no representations, warranties, or other commitments whatsoever about any non-Qualcomm sites or third-party resources that may be referenced, accessible from, or linked to this site.

Some articles appearing on Spark have been commissioned, and in some cases paid for, by Qualcomm. However, these articles are not intended and should not be construed as endorsements of Qualcomm or its products or services. The views expressed in such articles are solely those of the respective authors, and each author has editorial control and sole responsibility for the content of his or her article.

Michael Copeland
Sr. Manager, Marketing
More articles from this author
About this author

Related News

Spark
Invention is in our DNA; it's about time we got back to it
AUG 4, 2015

OnQ
International startups have their eyes on this year's QPrize
JUL 23, 2015

OnQ
Welcome to Qualcomm's Invent-Off [VIDEO]
JUL 17, 2015

OnQ
[UPDATED W/VIDEO] Chat with Futurist Jason Silva and Qualcomm EVP and CTO Matt Grob
JUN 30, 2015

OnQ
Trade legislation breal barriers to U.S. produc
JUN 8, 2015

We invite you to respond to our thoughts and share with us some of your own. If you'd like to post a comment, you need to follow our Posting Guidelines.

QUALCOMM

Site Map

Language

More Sites

About Qualcomm | Careers | Analyst Relations | Offices | Contact Us

Terms of Use | Privacy | Cookies | Site Map

©2015 Qualcomm Technologies, Inc. and/or its affiliated companies.

Nothing in these materials is an offer to sell any of the components or devices referenced herein.
References to "Qualcomm" may mean Qualcomm Incorporated, or subsidiaries or business units within the Qualcomm corporate structure, as applicable.
Materials that are as of a specific date, including but not limited to press releases, presentations, blog posts and webcasts, may have been superseded by subsequent events or disclosures.
Qualcomm Incorporated includes Qualcomm's licensing business, QTL, and the vast majority of its patent portfolio. Qualcomm Technologies, Inc., a wholly-owned subsidiary of Qualcomm Incorporated, operates, along with its subsidiaries, substantially all of Qualcomm's engineering, research and development functions, and substantially all of its products and services businesses. Qualcomm products referenced on this page are products of Qualcomm Technologies, Inc. and/or its subsidiaries.