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An update on Obama and American science: Uncovering US competencies

Sacha Boucherie
Elsevier

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During months of presidential campaigning Barack Obama spoke with great energy and enthusiasm about the power and promise of science. Soon after his election in November 2008 Obama took a bold stand for making decisions based on science and announced that he had assembled a scientific 'Dream Team', in which he brought together the highest impact scientists working in the US today to provide policy advice[1]. In his inauguration speech at the start of 2009 Obama's priorities in science became evident, when he spoke of "…wield[ing] technology's wonders to raise health care's quality and lower its costs; harness the sun, winds and the soil to fuel our cars and run our factories; transform[ing] our schools and colleges and universities to meet the demands of a new age"[2]. In February 2009, Obama signed into law The American Recovery and Reinvestment Act (ARRA), a stimulus package setting aside US$21.5 billion for federal research and development funding – one of the largest increases in research funding in decades[3,4].

President Barack Obama.
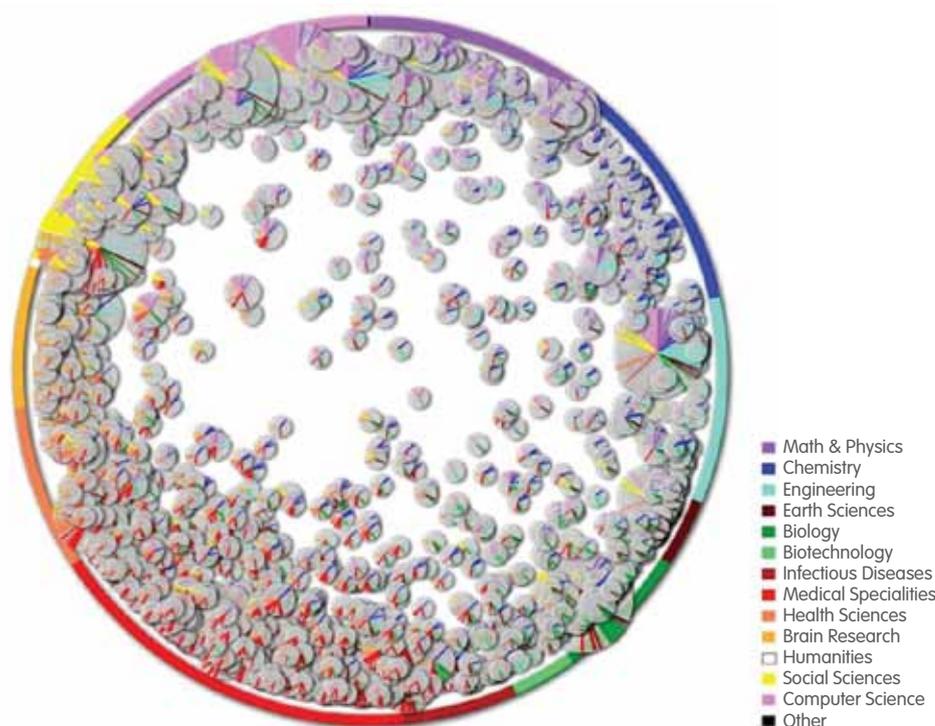Image from www.whitehouse.gov./

American science in the spotlight

Obama's conviction in the power of science and technology is not in doubt. But how likely is Obama to succeed in achieving breakthroughs in his target fields of clean energy, biomedical research and information technology? More specifically, within the broadness of these interdisciplinary fields of science, where do the US's (hidden) competencies lie? Research Trends uses SciVal Spotlight to find out.

SciVal Spotlight is a web-based strategic analysis tool, based on Scopus data, which offers an interdisciplinary perspective of research performance that helps institutional and government leaders identify their institution's and/or country's academic strengths. SciVal Spotlight differs from the more traditional method of evaluating research performance based on the broad classifications of journals in main subject areas, and instead follows a bottom-up aggregation of research activity that classifies all articles published within a given institution or country based on co-citation analysis. On a country level, it creates 'country maps' that illustrate academic performance across scientific fields, as well as in relation to other countries, and therefore provides a much more detailed view of clustered research output per country[5,6].

Overall Spotlight distinguishes 13 main research areas, with 554 underlying scientific disciplines spread between them. A Spotlight view of all US academic papers published over the five years ending 2009 reveals 1,707 distinctive competencies (DCs) within the US (that is, niches of excellence for which the US has a relative large article market share) – see Figure 1. These distinctive competencies, or DCs, become most informative when one drills down to see the main key words, journals, top disciplines, top authors and number of articles associated with them.

Figure 1 – SciVal Spotlight map for the 5 years ending 2009, showing 1,707 distinctive competencies (DCs). For more information on the Spotlight approach, see www.scival.com/spotlight

- ■ Math & Physics
- ■ Chemistry
- ■ Engineering
- ■ Earth Sciences
- ■ Biology
- ■ Biotechnology
- ■ Infectious Diseases
- ■ Medical Specialities
- ■ Health Sciences
- ■ Brain Research
- □ Humanities
- ■ Social Sciences
- ■ Computer Science
- ■ Other

US distinctive competencies

So which – and how many – of these DCs relate to disciplines that are central to Obama's vision of the promise of science? Given the broadness of these key fields, we chose to search by three selected disciplines which are sure to underlie each of the key fields: "biotechnology", "energy fuel" and "computer networks".

Our search on "biotechnology" revealed 24 DCs – that is, 24 areas within the broad field of biotechnology that the US excels in – which encompass studies varying from analysis of gene expression, metabolic acids, and the plasma membrane to enzymatic hydrolysis and ethanol production, with the percentage of articles by authors from US institutions ("article market share") ranging between 30% and 54%. In the "energy fuel" discipline the US has six DCs, one of which (for example) relates to studies of carbon dioxide and supercritical carbon dioxode.

Just three institutions – the University of Texas at Austin, the University of North Carolina at Chapel Hill and North Carolina State University – have a market share of articles of 30% on these topics. The "computer networks" discipline revealed five DCs, of which one, with an article market share of nearly 50%, includes studies on such topics as energy consumption and energy efficiency – a perfect example of one of Obama's key fields overlapping that of another.

Although a much more thorough and in-depth analysis is required to get a complete answer to our leading question – where do the US's underlying competencies lie? – with 1,707 DCs related to the research fields he aims to invest heavily in, Obama can rest assured: the US has great potential to meet the scientific and technological goals his administration has in its sights.

References:

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2. BBC News (January 2009) "Barack Obama's inaugural address in full".

3. Reisch, M.S. (2009) "Equipping the science agenda", Chemical and Engineering News, Vol. 87, No. 33, pp. 13–16.

4. SciVal White Paper (2009) "Navigating the Research Funding Environment".

5. SciVal Spotlight Prospectus "Establish, Evaluate and Execute Informed Strategies".

6. ElsevierNews (2009) "Elsevier Launches SciVal Spotlight: New Tool Provides Multidisciplinary View Of Research Performance".