Editorial

Research productivity in digital era

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With Genomics and Information Technology explosion the research paradigm is changing. The key stakeholders in biomedical research both academic and industry alike, demand a quantifiable demonstration of the tangible and meaningful outcomes with its significant impact on knowledge diffusion, healthcare professional uptake, and public health outcomes. Are we ready to embrace data deluge and silos in a comprehensive and optimized manner? Analytical dissection of research productivity and its metrics is one way to approach this enormous task. Two major scientific organizations, NIH and NSF, launched a program STAR METRICS in an effort to establish uniform and auditable measures of the impact of science expenditure, and to develop measures of impact on scientific knowledge, social outcomes, workforce outcomes and economic growth.[1] The measurement of research productivity in academia is neither straightforward nor easy. Traditionally it is captured as a number of publications and grants per assessment year, as well as publications' ranking and citations.

The time spent on actual research and the efficiency of the work done usually do not account for the actual impact the research would make on the societal and/or healthcare level. Neither does count the total costs incurred or resources consumed in that period (capital, energy, material, personnel). It was shown that the actual time spent on research by a faculty member is only 22%, while working alone on research projects 57% of the time.[2] In pharmaceutical industry, on the other hand, collaborative biomedical projects and partnerships are flourishing. Significant efforts are also made on defining specific and meaningful productivity metrics for drug development processes.[3] However, the collaborative work does not translate directly into efficient or productive research, as it encounters data format incompatibility and results diffusion between collaborating departments or institutions. That is why the current advances in collaborative computational technologies invigorate and transform biomedical research by acting as a key knowledge broker with ability to integrate and operate across divergent data types.[4] Reduced cost and increased throughput of genomic technology have created an unprecedented ability to generate an excessive amount of meaningful data for clinical research and drug development. In addition to exponential data generation, numerous tools have been developed to interpret that data, to share insights, ideas and expert opinions within research community.[5] There are over 250 web-based tools offered to academic researchers for literature exploration, data sharing, collaboration, writing and publishing, research evaluation and other activities.[6] No guidelines yet exist on making the right decision about which tool is the best match for individual researcher's tasks. There is no dedicated support exists for either scaling up these tools to support user's increased workload, or for tool's automation and customization in order to boost research productivity.

Moreover, the productivity of scientific research is getting a serious setback from Internet browsing and mobile devices. Researches browse multiple websites, logon to multiple web-based tools to perform regular online research projects with no tracking or saving of the search results, no study continuation, and certainly - no confidence in research thoroughness. Recently, it was shown that average user spends 23hours a week emailing, texting and using social media and other forms of online communication.[7] Clearly, the IT industry is facing an admirable task to develop tools and services that will not only allow for cross-talk between diverse type of data, but will support existing and evolving genomic technologies, will stimulate collaborative multi-institutional research projects, and will help users to stay focused on their primary mission- becoming experts in their specific area of scientific interest. Recognizing the trends in biomedical research and healthcare, the mammoths of IT industry, Google and IBM, both launched special programs. Google Scholar addresses the need in optimization of the online research, specifically-search for publications, while Discovery Advisor by IBM Watson Health group focuses on research and development projects in pharmaceutical industry, publishing and biotechnology.[8] Despite significant progress made on many fronts, much has to be done yet to advance research productivity both on bench and on-line, and to resolve mounting issues with data deluge and data silos.

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Conflict of interest

The author declares no conflict of interest.

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