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Opinion: Data to Knowledge to Action
Subhed: Introducing *DELSA Global*, a community initiative to connect experts, share data, and democratize science.

By Eugene Kolker and Elizabeth Stewart

Pizza on Tuesday within 2 miles of home? There is a search for that. Find a long lost high school friend or an out of print book? There are searches for that. Correlating genomic information with proteomics data, patient information, and drug trial results? You're on your own. It is ironic and lamentable that internet queries can get you information on so many things, yet the scientific data that are crucial to finding cures for numerous diseases are often buried in an unusable format on a hard drive in somebody's garage.

Science, technology, funding, policy, and media leaders will gather May 3-4 in Washington, DC, to discuss the continued efforts of *DELSA Global* (Data-Enabled Life Sciences Alliance International), which aims to accelerate and deepen collective, community-wide innovation in the life sciences. Life sciences research necessitates work across diverse domains. This is especially true amongst computer, cyberinfrastructure, and data experts in their effort to leverage opportunities in data-enabled science. Providing straightforward, equal, and sustainable access to data, computing, and analysis resources will enable true democratization of research competitions. In this environment, investigators will compete based on the merits and broader impact of their ideas and approaches rather than on the scale of their institutional resources.

DELSA Global aims to assemble an open, robust, collaborative, supportive, and sustainable ecosystem to enable greater utilization of existing resources. Oftentimes, for example, it may not be possible to cross-reference crucial data sets due to mismatched identifiers, incompatible formats or lack of technology capable of handling the workload. These barriers can prevent the discovery of key connections between experiments that, on their own, were unremarkable, but taken together, can support key research insights. A digital commons is needed to facilitate data and knowledge access. Such a system will serve to connect scientists and worldwide scientific knowledge and holds immense potential for unrealized research benefits. Instead of being thwarted by lack of resources, new ideas will be easily expanded or quickly discarded to make room for other approaches. Consequently, the progression of data to knowledge to action will be vastly accelerated, impacting every scientist, student, and citizen.

In May 2011, the necessity of a transdisciplinary approach to life sciences

research led to the creation of *DELSA Global* to build and promote this ecosystem. *DELSA Global* proposes to integrate expertise across life sciences and computing, industry and academia, cyberinfrastructure and analysis, and policies and media. The Human Genome Project was a pioneering example of a transdisciplinary approach in life sciences, yet it was just a start to the fully integrative mindset needed to successfully tackle 21st century scientific problems, which are more complex and diverse than ever before. Expertise must come from all walks of life, and the boundaries of the disciplines must be blurred.

DELSA Global doesn't start in a vacuum: multiple transdisciplinary initiatives are currently underway. These include, for example, the National Institutes of Health's CTSA Institutes and Beta Cell Biology Consortium, the National Science Foundation's CIF'21 Program and Advances in Biological Informatics, and the Department of Energy's Bioenergy Research Centers and Knowledgebase, to name a few. But these are the exception rather than the rule in life sciences, which still remains largely segmented.

The goal of *DELSA Global* is to connect leaders, stakeholders, and scientists all over the world and across all disciplines to take on grand challenges in science, education, environment, energy, ecology, food, security, and healthcare.

This framework will include the development of a digital commons to share scientific knowledge, identify and utilize initiatives from funding agencies, foundations, and industry, and enable sustainable collective innovation. In addition, *DELSA Global* has responded to recent community-wide requests for feedback and information from agencies such as the National Science Board and the NIH on data-enabled life sciences needs. These include, for example, broader access to data and analysis resources, inclusion of diverse expertise to transform data into action, and proper credits for data sharing, software usage, and participation in large collaborative projects.

Next month at its annual workshop in Washington, DC, *DELSA Global* will continue these efforts by identifying up to 10 short-term (1-2 year) projects, called TOP Projects. These projects will address diverse challenges of the global society, include researchers and experts from multiple disciplines, and be supported by *DELSA Global* through collaborative connections and assistance with identifying funding sources. Successful science is not just about what goes on in the lab and the field; it also relies on (to name a few) business acumen, cyberinfrastructure, and translational approaches to transition a discovery from the lab into products. *DELSA Global* will help its chosen project leaders through this process by partnering them with seasoned Executives In Residence that apply real-life expertise to all facets of project management, execution, and

delivery. Annually, *DELSA* will formulate a new set of TOP Projects and evaluate the current TOP Projects to further refine the transdisciplinary approach and identify improved methods for resource access and analysis.

Of course, it won't be easy. *DELSA Global* has identified a number of challenges that must be addressed. As the need for transdisciplinary teams grows, it has become obvious that the education, funding, and career development aspects of science culture must adapt. These require a shift in mindset from the one-scientist (one-lab), one-project approach so frequently taught. It should also transcend the 20th century one-institute (one-consortium), one-problem approach. But if successful, a collective transdisciplinary innovation approach should lead to trusted, globally accessible resources, thus reducing waste and freeing minds and resources for a further cycle of inquiry. One study suggests that up to 85 percent of resources are wasted due to stepwise inefficiencies in the process of moving research results to the patients and clinicians. As both data producers and consumers, we can do better.

Finding pizza is useful if you are hungry; finding a cure is a gift of life if you are suffering. What will you find today?

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