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of outputs such as books, articles, Websites, and audio-visual material, that comprise a field of study. In addition, many academic libraries have embraced technology that can expedite discovery of substantial quantities of information. To further explore the institutional complexities as expressed by the faculty, the Cornell University Library formed the Life Sciences Working Group. This group, whose expertise range from agriculture to medical and veterinary science to chemistry, identified a number of key areas for impact and examination, including the need to present a unified view of the Life Sciences at Cornell, via a single point of entry, where research and scholarship are emphasized. As the group considered approaches to connect life sciences research activities, events, and scholarly output from a diverse academic community, it became clear that an index providing links to Websites and resources would not reveal the kind of associations faculty sought. Thus, instead of preserving a linear hierarchy where research is affixed to people via their college, department or campus, members of the Life Sciences Working Group were determined to find a new way to cross-reference research and activities spanning multiple departments, centers, institutes and campuses to connect scholarship to its most basic element: the researcher.

Other academic institutions also active in scientific research have similarly created new research-focused discovery models. Similar Web-based efforts from institutions committed to fostering inter-disciplinary collaboration are taking place across the United States and abroad. HealthLinks at the University of Washington, and Bio-X at Stanford University, are two such systems that highlight research and communication in an effort to link individuals to their areas of research in an online environment that encourages scholastic connection. In addition, University of Florida's Marston Library has implemented the VIVO technology to develop their own comprehensive research tool, Gator Scholar. One non-U.S. based system, Find an Expert, from Australia's University of Melbourne, is a University-wide system that “turn[s] administrative data inside out” to provide the public with a user-friendly interface to discover experts on a particular topic. Creation of these, as well as many other research discovery models not mentioned here, seems to clearly demonstrate the need for interdisciplinary scientific research retrieval.

System

VIVO was created by Mann Library developers using an ontology blueprint from the Advanced Knowledge Technologies (AKT) project, an early Semantic Web project designed to discover and promote connections among computer science research activities across multiple universities in the United Kingdom. Ontology is, historically-speaking, a philosophical concept, but has more recently been adopted by information science as a process to express relationships within a domain; in this instance, the domain is Cornell, and the relationships are people and their research activities. The ontology reflects people in academia, and the affiliations they are likely to have, such as his or her relationship to a department, a graduate field, a research grant, a publication, or an event. As relationships overlap and intersect through common associations, a network of connections builds that can be entered at any point (typically by discovery through a search engine) and navigated to provide users a much greater sense of context than typical top-down, administratively-organized Websites. An ontology structure is particularly useful not only because of the collaborative emphasis within life sciences and medical research, but also because it can accurately represent Cornell's field-oriented structure for graduate studies, which cuts across traditional department and college boundaries. VIVO's ontology is "home-grown" in part because of the specificity of information desired by faculty. In addition, very few commercial systems could, at the time, effectively showcase an array of material that was constantly changing, highly inter-linked, and that permitted direct entry of new content by individuals (faculty) with little incentive to adopt anything beyond a simple interface.

Content is initially entered into VIVO both through manual curation and automated or semi-automated processes, but developers are promoting direct self-update as an important additional means of updating narrative information in the terminology of the moment. Input, as well as discovery, is bi-directional; thus, the link between faculty and field of study could be made by either declaring a field of study relationship to the person, or by declaring a field of study and then adding the person. Conducting a VIVO search will yield a display that clusters entities into broad categories, such as people, events, and organizations.

Sources of Content and Library Outreach

VIVO's content is culled by two primary means: automated data ingests from units that can provide standardized, machine readable data in a consistent format, and non-automated processes such as manual entry. VIVO's mission is to represent the breadth and depth of scholarship at Cornell and not to replace or replicate department or other university Websites which are designed for more thorough narratives, branding, multimedia, and document hosting. To this end, librarians identified and prioritized specific classes to populate first, such as people, research facilities, academic units, and graduate fields because cross-referenced content in these areas could quickly bolster the impact VIVO would have on the life sciences community. Populating each parent class with individual entities was a combination of manual and automated effort. Student editors, as well as librarians, surveyed publicly available Web and print resources from departments, laboratories, centers, and administrative units for information about institutional contributions to scholarship. This was complemented by certain content currently provided to VIVO though automated means by cooperation with several on-campus units including the Office of Human Resources (OHR); the Office of Sponsored Projects (OSP); the System for Tracking Administrative Records for Students (STARS); and internal college reporting systems. Some journal citations have also been harvested from commercial and non-commercial vendors. Data from these sources offer integral updates to the faculty and academic staff's overall summary in the VIVO system, providing such information as faculty and academic staff members' official department appointment and title (OHR), and grants reported and administered (OSP). In addition, colleges that have employed their own annual reporting mechanisms can elect to provide non-sensitive faculty information, such as research areas, professional activities, and publications. Publications have required a three-part effort to gather and display in VIVO: journal citation information has been brought continued on page 38