HUBzero®: an open source platform for scientific exploration in bioinformatics and medical informatics

Michael Zentner[1], Ishwar Chandramouliswaran[2], Richard Zink[3]

[1] Purdue University, West Lafayette, IN. Email: mzentner@purdue.edu

[2] National Cancer Institute, Bethesda, MD.

[3] Purdue University, West Lafayette, IN.

Project Website: http://www.hubzero.org
Source Code: https://github.com/hubzero
License: GNU General Public License

The HUBzero® platform is a cyberinfrastructure enabling online scientific communities to collaborate and explore science by sharing information and computational resources. HUBzero HUBs allow community members to collaborate using shared projects, groups, and resource collections. HUBzero HUBs also allow easy deployment of simulation and modeling tools such that a community members can put a simple user interface on their tools in a matter of weeks, and deploy those tools over the web, enabling others to run them in their browser without downloading or installing any code. Today approximately 60 scientific communities use HUBzero to support their efforts, realizing nearly 2 million visitors annually.

In disease research and care improvement, HUBzero has been adopted by the National Cancer Institute (NCI), U.S. Army Medical and Materiel Command (MRMC), the Regenstrief Foundation (RF), and the Regenstrief Center for Healthcare Engineering (RCHE) to form the HUBs NCIP Hub, cceHUB, CitSciBio hub, and CatalyzeCare. A goal of the National Cancer Informatics Program is to enable cancer researchers to create community driven, adaptive, and collaborative environments to promote exchange of research ideas and resources. The NCIP Hub provides this online collaboratory for the cancer research community. Members can contribute and use software tools, data, standards, or other relevant digital assets in this growing open access resource. NCIP Hub hosts nearly 400 public resources from topics including imaging, pathology and informatics. NCI's National Outreach Network has created a community of 'Community Health Educators' in NCIP Hub sharing the educational materials developed as part of their goals under the umbrella program to increase community knowledge and promote a diverse cancer health disparities workforce. MRMC and RF sponsor cceHUB, a site where many special interest communities share data and use advanced data search and exploration interfaces to apply systems engineering principles to the treatment of cancer. NCI has sponsored the CitSciBio hub to create an online collaboration space for the growing and virtually dispersed biomedical citizen science resources, projects, references, methods, and communities to be discovered and engaged by interested stakeholders. RCHE has formed the community Infusion Pump Informatics (IPI) on their CatalyzeCare hub that has been adopted by more than 140 hospitals. Hospitals voluntarily contribute the alert streams emanating from smart IV pumps to the IPI community. As part of the agreement for joining, such hospitals are able to benchmark themselves against the other hospitals in the community. Collectively, their goal is to improve overall patient safety by creating a set of best practices regarding infusion pump alarm treatment processes. As these communities interact with their HUBs, we expect to contribute to the creation of a 'community impact score' based on data sharing, software sharing, discoverability, annotation, and of course use and reuse. Individuals engaged in cancer research or medical device informatics can become members and contribute by visiting www.nciphub.org, www.ccehub.org, www.citscibio.org, and www.catalyzecare.org respectively.