

The ICTBioMed NCIP Hub: Cancer Research in a Science Gateway on World-Wide Scale

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ABSTRACT

ICTBioMed, the International Consortium for Technology in Biomedicine[1] is a consortium of members including the Center for Development of Advanced Computing (C-DAC), Pune, India; Poznan Supercomputing and Networking Center, Poznan, Poland; the University of Notre Dame Center for Research Computing, Notre Dame, USA; Chalmers University Life Sciences Supercomputing Networking Center, Gothenburg, Sweden and Internet2, USA. Additionally, experts from Arizona State University's Computational Sciences and Complex Adaptive Systems Initiative; Duke Comprehensive Cancer Center, and Tata Memorial Center in India are also involved. ICTBioMed consortium[2] and its participants believe in decentralization and democratization of science. The consortium has developed strategies to develop ready to use research initiative and helps all to join in bridging the gap between Research, Implementation and ready to use science. We have identified actual science use cases with the help of the collaborative partners to access shared data and methods using the principles of Science gateways. ICTBioMed has set up a NCIP Hub[3] instance based upon the HUBzero[4] framework and started using it for community research activities. It is an environment for scientific collaboration where researchers can access and take advantage of a variety of resources shared by others. The NCIP Hub supports a community of members with a shared access to data, tools, and standards across the cancer research community dealing with one of the most complex problems in research. Thus, there is the need for a collaborative effort to solve the problems and the legacy methods of problem solving are not sufficient enough. One of the first use cases is concerned with quantitative cancer imaging targeting a community of clinicians and researchers. Cancer researchers have access, in principle, to a wide range of data and software tools. In practice, however, they make limited use of these resources. Barriers that restrict access include the need to install software locally, inconsistent user interfaces, security concerns and poor documentation. We are working on developing a cancer science gateway that will greatly simplify analysis in cancer imaging research by offering a single point of entry and a unified interface for multiple tools, databases, and image repositories widely used by the community. We continue the development of tools and pipelines to address practical needs, unanticipated use cases, and clinical trials

based on feedback from researchers and clinicians considering their diverse environment and needs. We are also implementing the workload execution platform support with the help of the HUBzero development team to incorporate the Docker[5] support. Implementing a Docker execution host model that integrates into the HUBzero platform facilitates running Docker containers against a dataset in the context of the Hub platform. Some of the target platforms for this implementation work are 3D Slicer[6], XIP (Extensible Imaging Platform)[7], MITK[8] and AIM (Annotation and Image Markup)[9]. The NCIPHub Science Gateway is used to give convenient access to data and tools with a single point of entry for multiple organizations. ICTBioMed has expertise as an aggregate of all its participating organizations including supercomputing centres, academic universities as well as hospitals. The borderless collaboration has been made a reality including Asia, Europe and America with a focus on biomedical research. The common goal is to solve real life biomedical problems by facilitating collaborative research.

Keywords—*biomedicine; cloud; international collaboration; ICTBioMed; NCIP Hub; HubZero; cancer research*

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