

NIH National Conference on Knowledge Environments for Biomedical Research National Institutes of Health, December 11-12 (2006)*

Definition of Knowledge Environments

Knowledge environments form the informational infrastructure necessary for computation upon data. Such computation includes organized storage, querying, federation, sharing, analysis, modeling, visualization, etc.

A knowledge environment comprises the entire set of formalisms, explicit definitions, and their relationships related to the data computed upon. This includes, but isn't limited to: what the data represent in the real world and what they are termed (vocabulary), how those terms relate to each other (ontology), as well as models, schemata, formats, and relationships among them.

Knowledge environments are important because digital data, tools, and resources can interact and interoperate only when their knowledge environments are shared, or when their knowledge environments can be mapped (translated) among the different datasets, tools, and resources.

Strategic Principles for Developing Knowledge Environments for Biomedical Research

- KEs should be developed for circumscribed, coherent research communities (e.g., communities defined by data types or other data-related aspects) – not for all of biomedical research
- The size of the community (and its information, data, and tool space) for which KEs are developed should match the resources available
- KEs would be most useful to a research community that meets three criteria:
 - It is well-poised to benefit by KEs (e.g., the community commonly uses digital data acquisition, uses informatics and computational tools, wants to share or rigorously compare data)
 - There is a clear need for KEs in that community (e.g., as identified by the community at-large over time, by significant position papers, by funding agency)
 - It is able and willing to participate in the development of KEs
- KE development and implementation requires participation by domain scientists, tool and resource developers, professional societies and similar organizations, the publication enterprise, and the funding agency. Roles for these sectors may include:
 - Domain scientists are the knowledge experts
 - Provide leadership
 - Senior thought leaders to identify key issues
 - Junior substantive experts to work out details, curate, etc.
 - Tool and resource developers
 - Work with the domain scientists to implement KEs in software
 - Work among developers to identify technical solutions and common conventions to improve compatibility and interoperability
 - Professional societies
 - Engage the research community
 - Identify senior and junior domain scientists
 - Solicit broad community input on KEs, their implementation and evolution
 - Publication enterprise
 - Encourage the compliance of publications with KEs
 - Adopt conventions of the common KEs for publication-based resources (e.g., databases, etc.)
 - Funding agency
 - Provide organizational and logistical framework
 - Provide funds for incidental activities
 - Provide sanctions for use of KEs within a research community
 - Promote the use of KEs across subdivisions of the agency and across agencies that are relevant to the research community
- KE development and implementation are ongoing, long term, dynamic, and cross-cutting processes that should be resourced and managed in appropriate ways that provide ongoing evaluation, means for correcting direction, and support from across relevant funding units.

* See also Partha P Mitra, NIH Conference on Knowledge Environments for Biomedical Research (Dec 11-12, 2006), *Neuroinform* (2007) 5:139-140