

The *Virtual* Innovation Hub:

Stewarding the Flow of Ideas

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Proposal

Information and Educational Technology (IET) and the University Library propose the creation of a *Virtual* Innovation Hub for use by Innovation Hub partners, leveraging developing campus services for interdisciplinary collaboration and data stewardship. The concept is a comprehensive, scalable, and sustainable infrastructure, both local and “cloud” based, in support of the Innovation Hub that not only **enables the exchange of information**, as described above, but also **enables good stewardship of that information over time**.

Components of this infrastructure would include:

- A video and audio conferencing infrastructure to enable virtual meetings.
- Electronic mail, discussion forums, wikis, and other collaboration services that disseminate and record the evolution of group-created ideas.
- A data repository that stores the intellectual products of the use of these collaboration services within a sustainable framework that enables best practices for stewardship and preservation of those information objects. Associated with this repository would be:
 - Descriptive metadata and a suite of access methodologies to enable reuse and discovery of information objects
 - Controls to prevent unauthorized access
 - Bulk data ingest for information objects that are not generated by the collaboration tools
 - Linkages to specialized repositories
- Discovery services to identify potential research partners, including UC Davis researchers and students.
- Virtual organization administration tools to define and to organize the members of collaborative projects and those members' authorizations for services and information objects.
- Consultation services to assist researchers and innovators with the stewardship of their data and persistent linkages to other data repositories.

Technology-enhanced research and innovation is a new and evolving field. Over time, we expect evolution in the services and the tools used in support of innovation. Because of this, we view this infrastructure also as a real-world laboratory for potential Innovation Hub partners doing work in this field. The design would accommodate a range of experimental tools and services; and the repository would maintain a record of what worked, what did not work, and why.

Proposal Rationale

The flow of ideas and data lies at the very heart of research and innovation, and it will be fundamental to the UC Davis Innovation Hub. The very concept of a hub implies a collaboration space where partners meet to exchange, debate, test, and refine their thinking.

In the 21st century, those collaboration spaces are more often in the virtual world than the physical. For example:

- Partnerships are often geographically remote, so "face-to-face" meetings are replaced with video and audio conferencing.
- People work any time of the day or night, and in different time zones, so electronic mail, discussion forums, wikis, and similar tools are used to enable communication among project participants without the need for everyone to be in the same place (even virtual place) at the same time. These tools also have the benefit that they can automatically record the evolution of ideas through group interaction.
- Professional networking is no longer the sole domain of conferences. Tools such as LinkedIn are becoming part of our professional lives.

These issues are becoming part of the national research agenda. For example, community research networks and data-enabled science are lynch pins of the National Science Foundation's *Cyberinfrastructure for 21st Century Science and Engineering (CIF21)* strategy:

New cyberinfrastructure tools and changes in the research process have enabled community research networks to address complex, multi-disciplinary problems of societal concern such as competitiveness, security, economic development, and well-being. Community research networks enable people and organizations to perform everyday research functions more effectively by building on and integrating diverse resources, knowledge, and abilities. (p.31)

Also,

Data are being generated at prodigious rates across science and engineering, leading to new insights, innovation and discovery.... Because generation, use, curation, and reuse of data are critical components of all science and engineering, CIF21 emphasizes immediate and long-term data support and infrastructure and the development of data intensive computational algorithms and mathematical and statistical methods including data analytic tools, interoperability, and repositories. (p.30)

In addition to its direct relevance to the strategic national research agenda, the UC Davis Virtual Innovation Hub will be critical to carrying out the bold, innovative, interdisciplinary and collaborative goals laid out in the *UC Davis Vision of Excellence*. The concept of the Hub itself is fundamentally anchored in our campus' spirit of innovation and discovery, and as such it will make possible a broad range of new and transformative opportunities for dialogue and collaboration. It will provide the foundational framework through which our campus will be able to re-invent itself and effectively pursue excellence, now and in years to come. Specifically, the Hub will directly support campus strategies related to:

- Fostering a Vibrant Community of Learning and Scholarship;
 - Driving Innovation at the Frontiers of Knowledge;
 - Embracing Global Issues;
 - Nurturing a Sustainable Future and Propel Economic Vitality;
 - Championing Health, Education, Access and Opportunity; and
 - Cultivating a Culture of Organizational Excellence, Effectiveness and Stewardship
- <http://vision.ucdavis.edu>

Any institution like UC Davis, with aspirations to excellence, must facilitate open exchange of ideas and data, wherever faculty, students, staff, colleagues, and friends of the University might be. We must also have a carefully crafted mechanism in place to ensure we can be good stewards of that increasingly vital information. Without consistent stewardship, our ability to access and make effective use of our institutional data assets will remain limited to the original creators of that information, and preservation practices will be *ad hoc* at best, and over time will result in irretrievable loss.

Meeting Innovation Hub Objectives

This proposal addresses each of the Innovation Hub Initiative's major objectives in significant and critical ways, as summarized below:

- **Partner in advancing the economic prosperity of our region and enable transfer of knowledge and technology developed on the UC Davis campus to the marketplace.**

Connecting UC Davis researchers to industry partners is a two-stage process. First, customized social networking services enable the introduction of potential partners to UC Davis researchers who are working in disciplines of mutual interest. Once introductions are made, the repository and common tools and services facilitate the collaborative venture.

- **Deepen the University's connections to the regional, national and global business communities.**

The *Virtual* Innovation Hub has no geographic boundaries, leveling the differences between regional, national, and global communities.

- **Support a culture of entrepreneurship to transform UC Davis research innovations into successful for-profit enterprises.**

The *Virtual* Innovation Hub supports the culture of entrepreneurship with a stable, secure virtual space for innovators to meet, interact, and work at any time and from anywhere in the world.

- **Provide educational and networking opportunities for faculty, staff and students to develop and demonstrate the commercial value of their inventions.**

UC Davis's faculty, staff, and students meet as peers with potential partners in the *Virtual* Innovation Hub through the custom networking services, providing ample opportunity to develop and demonstrate commercial value.

Timeline

The *Virtual* Innovation Hub will grow over time, as will the UC Davis Innovation Hub itself. For this reason, we propose starting with a one-year plan to utilize a rapid deployment paradigm and leverage partnerships to deploy services that deliver value quickly but can also evolve quickly as needs change. We will deploy local and cloud-based external massively scalable storage and preservation services that do not require large capacity purchases when demand is low, but can grow to meet virtually unlimited demand over time.

Proposed First-Year Implementation Steps

- Within the first month, create an advisory board of Innovation Hub participants to identify the technology needs to support the projects and to guide the infrastructure needed to sustain future collaborations.
- Within 3 months of board member appointments, complete needs assessment.
- Within 6 months of needs assessment completion, implement the initial collaboration suite leveraging existing technology tools, such as social networking services, the California Digital Library's Curation Services, the UCSD partnership with the San Diego Supercomputer Center services.
- Within 2 months of completing the prototype, implement the following:
 - Service Level Agreements with relevant providers, based on provider type.
 - Continuous universal design techniques to develop the Innovation Hub infrastructure as a stable work-in-progress product
 - Continuous vetting and assessment processes to ensure relevancy and appropriateness of the infrastructure
 - A sustainable funding model to support ongoing support and the future infrastructure enhancements needed.

Required Partnerships

The University Library and IET will contribute their unique expertise in curation and technology, respectively, to the project. Partnerships with "cloud" service providers like the San Diego Supercomputer Center and the California Digital Library will ensure a timely and effective implementation. Collaboration with the Office of Research can facilitate the execution of industry and government research contracts with UC Davis faculty. Finally, specific faculty experts from across the campus (e.g., computer science, Digital Humanities institute, application researchers) will contribute their disciplinary expertise and research problems to inform the developing Virtual Hub.

Industry partners developing products and services in the areas of information management, data storage, collaboration, and social networking can make the *Virtual* Innovation Hub itself a subject of research and innovation. Examples of potential partners we would solicit include:

- Oracle
- IBM
- Microsoft
- Hewlett-Packard
- EMC
- Brocade
- Cisco
- Amazon
- Google

A precise budget estimate will depend on the needs assessment, but we believe the first-year budget estimates to be:

Video Conferencing Hardware	\$180,000
Server Hardware	\$50,000
System Administration (1.0 FTE)	\$100,000
Software Development (1.0 FTE)	\$120,000
Technical Consulting (0.5 FTE)	\$60,000
Curatorial Consulting (0.5 FTE)	\$60,000
Service Management and Reporting (0.5 FTE)	\$60,000
Project Leadership (1.0 FTE)	\$120,000

Basic Cost Subtotal	\$750,000
Storage (250 TB @ \$500/TB)	\$125,000
CDL / SDSC Preservation Fees (20% preservation @ \$1090/TB/year)	\$55,000

Scalable Cost Subtotal	\$180,000
Potential 1 st Year Grand Total	\$930,000

Support for some of the costs of establishing and maintaining this UC Davis Virtual hub will be required from campus. Funding options for further consideration include:

- Asking Innovation Hub participants to contribute the scalable costs, according to what they use.
- Asking Innovation Hub participants, particularly vendors of products, such as those listed above, that are in the collaboration, storage, and data management spaces and would like their products associated with the Innovation Hub, to cover basic costs.
- Identifying grant opportunities to fund some of the fixed and scalable costs, since this infrastructure will be shared for learning and research.

A sustainable funding model will be developed in conjunction with the Innovation Hub participants during the first year to address ongoing costs in subsequent years.

We anticipate great return on investment for UC Davis once the infrastructure and virtual services necessary to the success of the Innovation Hub are in place, as a range of teaching, research and collaboration initiatives will be able to start leveraging the power of those services.