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Re: Planning Document: Information Services 2030

cc: Provost K. Enz Finken

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**Information Services 2030**

The typical strategic planning exercise of laying out a 5-year trajectory of services and issues is challenging. Trying to predict what will happen with technology and digital resources 15-years out is closer to science fiction. We can attempt to extrapolate the growth of existing services and technologies and make some pretty good guesses about which things will grow. We can also anticipate others by careful scrutiny of the industry press, but there is no way to account for the totally new, unexpected and usually disruptive technologies, the ones that change the world.

In 1992, we had *Archie* and *Gopher* to find and discover resources on the internet and thought the world was finally making good use of the personal computer. There was nothing that prepared us for the introduction of the *World-Wide-Web* in 1993. *Archie* and *Gopher* were instantly abandoned and our expectations for which services and information could instantly be at our fingertips was forever changed. In 2001 the professional publishing industry “flipped” their publishing model from one based primarily on paper to one that relied on digital distribution. In 2010, the introduction of the iPad, while anticipated, was an immediate success and created a whole new way for people to interact with their computing devices. Touch screens and gesture-based input increasingly became the norm. Personal computing was becoming much more personal and ubiquitous, and access to digital resources was growing exponentially.

The number of technologies to be considered in looking into the future is long. Consider the following list of regularly tracked technologies by the New Media Consortium (NMC):

**The 2014 NMC Master List of Tracked Technologies**

<table>
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<tr>
<th>Consumer Technologies</th>
<th>Social Media Technologies</th>
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<tr>
<td>3D video</td>
<td>Collaborative Environments</td>
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<tr>
<td>Drones</td>
<td>Collective Intelligence</td>
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<tr>
<td>Electronic Publishing</td>
<td>Crowdfunding</td>
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<td>Mobile Apps</td>
<td>Crowdsourcing</td>
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**Cal Poly 2030: One Connected Community**

A campus is like a small city. The classroom, or virtual class, experience requires layers of technology and services in order to work. Everything is built upon infrastructure – power, networking, telecommunications, data center storage and application support – to support the end-user experience. The end-users, students and faculty, require access to personal technology, often acquired directly, or to special computer and technology-based labs supported by the university. The user needs software, digital content and a variety of services provided by ITS and the Library to use those resources. We can talk of infrastructure as something different from the
technology that a student holds in their hands but it is all closely interconnected. It is all in support of learning and the academic mission.

All universities provide a wide-range of technologies and services in an attempt to support learning. There is a special expectation, however, that Cal Poly as a comprehensive polytechnic and a Learn-By-Doing centered institution will provide highly integrated access to technology and at a higher level than the typical university. Investment in technology that creates a connected, comprehensive and contextual experience for students is one way to highlight what makes Cal Poly different from the typical university.

We know that several existing technologies or those expected to come to market in the near future can be integrated to create an environment that personalizes the student experience in support of their success. Coupled with information gathered from previous actions and synthesized to predict behavior under similar circumstances, we can create a figurative sphere of information that surrounds a student wherever they go, anticipating their needs, removing barriers and exposing opportunities for discovery. Privacy, integrity of information and access to resources, responsible use, etiquette, and our approach to interpretation of data are all policy issues that the campus will need to address in conjunction with the expansion of these technical capabilities.

Technologies and information processing needed to create this individualized experience can be categorized into three areas:

**Access**
- **Interacting in the physical world**
  - *Ubiquitous access* – “the Network is Everywhere”
    Core to the success of achieving a truly personalized Cal Poly experience is seamless, secure and ubiquitous access to information and technology based resources. The “Internet of Things” collects data and provides context
    Real-time information about a student’s physical location along with data about current activities as well as what has happened there in the past, can let technology anticipate needs, present challenges and options and guide students through an experience emphasizing the desired learning outcomes or progressing through a transactional process needed to support their academic career. Sensors, cameras, geolocation technology, 3D mapping information and media presentation technologies (holographic displays) all will contribute to this experience.

- **Accessing the virtual world**
  - *Personal devices are windows into the Cal Poly experience*
    With ubiquitous access and information residing “in the cloud”, personal devices become a window into virtual personal space. Based on who the user is, devices can interface with the virtual environment, know who he/she is interacting with and what they are trying to do. Devices that are completely independent of the content will be there only to provide an interface between a person’s verified “identity” and the content and context provided via “the cloud”. Wearable devices, secure methods of identification, natural ergonomic interfaces such as voice patterns, visual cues and gestures will enhance the contextual experience.
- Access to high value assets are not bounded by physical location
  Virtual spaces, sophisticated “what if” scenarios using virtual modeling, remote access to one-of-a-kind labs and technologies, and the creation of physical assets which can be recycled using technologies like 3D printing will open up the access to high value assets that support the Learn by Doing experience.

Data Collection and Analysis to Discern Useful Patterns to Inform Action

- Patterns derived from collected data informs predictive services
  All transactions that relate to Cal Poly activities can be analyzed for patterns that in turn can inform how to tailor services. Technologies that support data collection, analysis and workflows will be considered as core infrastructure. This will enable timely outreach to students to remove barriers, encourage access to resources and connect with others.

- Process design approaches (several sizes fit most)
  Processes will be designed to guide rather than control by taking a many sizes fits most approach. One size fits all process design leads to 80/20 rule (80% might fit if they jump through the right hoops and 20% are treated as exceptions). Many sizes fit most leads to process designs that use common approaches but accommodate the most common “detours”. For instance, this can result in 20/20/20/18 rule (98% of people use one of 5 different paths to get where they need and only 2% are truly an exception). Therefore processes can be designed for the rule(s) and not to gate the exception. Technology and the pattern recognition resulting from analysis of on-line transactions and the internet of things exposes multiple paths to reach the same destination without requiring additional human resources to keep a student on track.

Anticipating Needs

- Presenting contextual information
  Multi-media content enables a tailored experience based on learning style. As technology tools make it easier and easier to create content in multiple media formats, choices open up for students to select those that best fit their learning style. Technology tools that can help with conversion of content into multiple media interfaces (aural, kinesthetic, solitary and social interactions, verbal, logical, or visual/spatial) can increase engagement and retention.

- Offering suggestions for next best steps
  ITS will not be in the business of supporting consumer-based technologies. Instead, ITS will take advantage of those technology stacks, user experience concepts and information unique to Cal Poly to support learning, support the social experience of being part of the Cal Poly community and guide students through the administrative processes they need to fulfill in order to achieve success.

- Exposing opportunities for investigation and discovery
  With the ever expanding access to core curricular concepts, Cal Poly will either need to let others provide a consumer based approach to learning in these areas or differentiate the
content to enhance the Cal Poly learning experience. One approach may be to utilize technology to combine content created by others and with elements that prepare our students to be whole-system thinkers.

**eLearning**
The use of technology to support pedagogy is in transition. While faculty remain cautious now, the expectations and innovations of learning institutions outside academia will drive change. Economic reality will further encourage the use of technology for learning. Looking out 15 years we should expect that the use of technology in the classroom, physical or virtual, will be creative and pervasive.

In order to remain competitive, Cal Poly will need to invest in the technical expertise and the technology to ease faculty through this transition. Faculty have the discipline expertise and the understanding of learning goals and objectives to effectively utilize eLearning techniques to enhance the polytechnic learning experience. The use of simulations, modeling, big data analysis and other technologies will only grow in industry. Cal Poly in its mission to educate students for professional careers will need to make use of the same techniques to enhance learning in the 21st century.

**Higher education and academic libraries in 2030:**
*Extended networks of learning*
While libraries will retain a vital local role in the ecosystem of learning spaces on university campuses, libraries will also have a growing role in extended educational networks with many nodes that include future versions of today’s massive open online courses (MOOCs). Distributed online access to library services and information will go beyond mere delivery, and become increasingly interactive and multi-directional:

- Libraries, along with publishers and product developers will need to meet a growing demand for personalization and participation in information experiences and environments.
- In addition to creating and licensing content, libraries may create or license platforms that support these experiences.
- Libraries will help students and faculty integrate these participatory platforms into their learning and research, and will help them practice, integrate, navigate, and manage virtual roles and identities in these environments.
- This in turn will lead to the evolution of the librarian role to that of social planner, engineer, designer, and teacher – with complementary disciplinary and professional expertise.

**New licensing and access models**
The new variety of affiliations and roles library users have with the university through satellite and hybrid programs will require libraries to invest in more nuanced user authentication, more flexible licensing of purchased resources, and protocols and standards for directly sharing resources across institutions, rather than using traditional interlibrary borrowing protocols.
Adapt to changing ecology of publishing
The growth of open access models for publishing will have progressed to the extent that library information budgets will stabilize and new resources can be invested in providing sophisticated digital platforms for ideation, creation, analysis, and other modes of inquiry and making. At the same time, the explosion of niche publishing and the ‘long tail’ of information will become a new challenge that will inspire library services and instruction. This in turn will feed the presence of libraries into nodes throughout a distributed mid-century information grid.

Student-driven, participatory learning
The demand for personalization and for participation by students of their own learning processes will put new pressure on libraries and universities to create highly flexible, technology-supported, 24-hour, safe places for meeting and work, that encourage learning in all modes – group, solo, informal and formal, scheduled and ad hoc.

Libraries will intensify their role as a hub for active studio-like activities, where students not only experience and exercise choices and forge social and intellectual identities; they will also practice future workplace skills: collaboration, networking, presentation, visualization, inquiry, seeking help, creating, and organizing and prioritizing tasks.

Libraries will meet these participatory needs for remote students by hosting sophisticated virtual presence capabilities, and virtual studios and sandboxes where students can practice a huge range of skills, build networks, and make use of digital discovery and creation tools, AI, and machine learning, as well as more conventional software tools used in analysis, synthesis, communication.

Kennedy Library in 2030
Expanded space
By 2030 Cal Poly will have completed and opened a visionary new library expansion, the Academic Commons, anchoring a lively multi-use indoor-outdoor academic space. The Academic Commons will offer advanced physical spaces and digital platforms for bringing students, faculty, and the expanded network of affiliates and satellite locations together as part of the extended virtual Cal Poly campus.

Participatory physical space
Here, Cal Poly students will develop and practice the skills and experiences they will need to thrive and contribute to a rich and complex information landscape, in peer-to-peer and active learning settings. The library will play a critical role in providing every student, whatever their preparation or affiliation, with equitable access to these experiences. “Genius bar” services will abound throughout the library and academic commons: friendly human greeters and coaches will also help students take advantage of virtual 24-hour services from campus advising, career, financial aid, and crisis resolution experts.

Participatory virtual learning spaces
The library will support the university’s new curricular models, offering environments that integrate on- and off-campus affiliations for individuals or groups. This will include telepresence spaces and virtual satellite campus spaces with live feeds from a partner campuses and locations. The library will also host simulated learning environments, and crowd-sourced interactive
learning activities, where students can accelerate skill-building across many areas, from organizational leadership to communication to programming to language to cultural competencies.

**Students in 2030: Library implications**

**Collaboration opportunities**
The increased focus on integrating, admitting, and serving remote learners on the one hand, and out-of-state and global students on the other, will open up interest and opportunities for libraries to form new collaborative initiatives, both nationally and internationally, to create an international sense of community and “connectedness.”

**Deeper, strategic work with student employees**

Our library will continue to rely on a rapidly developing, multi-skilled workforce of students who will continue to bring fresh ideas, multiple perspectives, and a high level of creativity to our work in the library. We will need to support their work at higher levels including helping them document their contributions and overseeing credit-bearing experiences. Because the library profession remains challenged in its ability to recruit ethnically diverse students into professional library careers, our work with student assistants may also pave the way for leveraging the changing demographic of students to help build a more diverse library workforce.

**Bridging disciplines**
The bridging role naturally played by academic libraries will serve the growing campus desire for cross-disciplinary zones, tools, spaces, and opportunities that support those interactions through collaboration, interaction, teaching and learning. By providing opportunities for members of the community to participate in documenting and reflecting on their own or other cultures, generations, and histories, the library will provide a precious reflective space on campus that builds deep connections and important civic and ethical values.

**Impacts of global and local economy on libraries**
As new programs are added, our library resources and faculty expertise and outreach will support these programs. In addition, our own focus on sustainability will increase, whether in developing partnerships with other libraries, committing to “green” building and work practices, or developing foundational experiences in solving complex problems of the global economy and environment.

**Changing demands of workforce: library implications**

**Lifelong skills**
Libraries and a new cadre of librarians will support the need students will have for skills of inquiry and communication by designing and supporting the self- and peer-directed experiences where interpersonal skills, inquiry, and other complex skills can be practiced in a safe and supportive environment. Personal support and coaching of developmental and capstone experiences will be a growing role for librarians, in partnership with college faculty, Student Affairs, and others.
**Information access for advanced students**
New pathways for undergraduates to advanced degrees will challenge Cal Poly’s library to develop appropriate cross-institutional information access agreements, and to ensure that advanced students have access to the specialized information and support they need for success in research-based graduate programs.

**Anticipating and adapting to change**
The needs of our graduates will continue to change. Continual and spontaneous assessment and re-assessment of programs and services will be necessary to evolve and maintain pace with library users. The future library will strengthen the resilience and sustainability of the university, and help Cal Poly’s students thrive and adapt in evolving and complexly interconnected human, natural, and material systems.

**Emerging fields and integrated learning: library implications**

**Role as hub**
The library’s core competencies include bringing digital and analog (material) modes of inquiry and practice together in appropriate and varied ways, and serving as a dynamic and continually updated hub of connections between individuals, ideas, cultures, perspectives, and skills.

**Implications for search and access tools**
Integrated fields of research and practice will challenge libraries to develop nuanced connections based not on content packages but on processes, patterns, choices, and agents. Already search engines are being developed that generate hypotheses, recommend methodologies, link instruments, and display both actual and potential relationships between people and their work. These tools, supported by semantic web and linked data, will become increasingly sophisticated and accessible aids and will become the primary interface for what we now think of as “research literature.”

**Active role in generating integrated learning**
Libraries will also support the development of challenges, competitions, portfolios, events, and other ways of generating and packaging and sharing creative work.
References


http://www.clir.org/pubs/reports/pub162

