California Digital Library Strategic Vision Future Trends and the Digital Library Environment

Background: In 2017, the California Digital Library undertook a strategic visioning process. Early in the process, CDL staff and program teams conducted a series of exercises designed to identify trends within the academic, technology and social environments holding potential to significantly impact the environment within which CDL exists and, ultimately, must thrive.

1. Trend >>> Information Surge

Information types, production and distribution will continue to evolve and expand exponentially, requiring new structures for managing and making sense of it. A significant portion of this information will reside outside the direct control of the academy and of libraries more generally. Approaches to information stewardship (including collection and curation, description, citation, access, discovery and preservation) will be re-factored to accommodate an ever-widening array of digital information types, sources and uses.

Opportunities:

- New methods for discovery and retrieval of non-traditional digital information types
- Unique identifiers for granular portions of works for citation, search, display
- Linked data
- International Image Interoperability Framework (IIIF)
- Unified data model and persistence layer; universal access hub
- Tools for creating custom collections on the fly across genres, types and geographic locations
- Automated extraction of descriptive metadata

2. Trend >>> Dominance of Data

As the volume, velocity, and variety of data generated and captured expands, developments in and demand for data mining and analysis will increase, and the requirement for heavily pre-structured data and metadata will diminish as computational techniques structure data on the fly. Within academia, the trend toward regarding underlying data (and software, workflows, protocols, etc.) as equally important to the scholarly outputs that build upon it will continue, and traditional library collections will increasingly function as data with which to interact.

Opportunities:

- Data analysis, text mining

- Data/software/library carpentry; development of fundamental data/IT/information literacy skills needed to conduct research

- Visual display of quantitative information

- Services and tools for tracking, processing, communicating data

- Collections as data

3. Trend >>> Networks, Coalitions and Consortia

Universities, non-profits, private industry, government entities and NGOs will form partnerships to define and achieve goals, adjusting their local bureaucracies and incentive structures to actively cultivate cross-sectoral, cross-institutional engagement. To effectively produce, manage and influence scholarly research, data and content at scale, libraries will form meaningful networks, alliances, coalitions, consortia and strategic partnerships.

Opportunities:

- Engage at network level; mediate the network level; spin local services off to the network level

- Models for agile transitioning of services in/out of CDL

- Strategies for resourcing/rightsizing as roles shift

- Clarity on determining what can be "outsourced" to networked/commodity solutions, and what can be best addressed locally

4. Trend >>> Institutional Priorities

The continued relevance of the academy will be measured by its ability to have a direct impact on solving real world problems in a rapidly changing environment. The humanities and much of the social sciences will be underfunded and often two steps behind the technological revolution that is transforming the world of STEM research and scholarly communications. Expectations related to transparency, quality, and impact will intensify pressure on administrators at all levels to demonstrate uniquely added value and alignment with clearly defined institutional priorities, as well as externally articulated priorities, e.g., by state or federal government. Organizations, including those within the academic, library and nonprofit sectors, will increasingly adopt an approach to management and decision-making that incorporates data gathering, analysis, interpretation and visualization.

Opportunities:

- Cross-disciplinary teams supporting basic and applied research

- Focus on real-world problems the commercial market isn't solving; adapt and integrate efficient, cost-effective commercial solutions when available

- Explicit need to demonstrate accountability/value to organization, scholars, students, content consumers

- Data-driven decision management

5. Trend >>> Funding Shifts

Publicly funded investment in innovation, e.g., NSF, NIH, IMLS, will decrease, and the role of foundations and the private sector in funding and stimulating innovation will expand. As traditional institutions (universities, governments, etc.) are weighted down by decreased public funding and the difficulty of responding in an agile manner to new challenges, non-traditional players will have an opening to offer game-changing solutions. Philanthropic organizations will adopt a "venture capitalist" approach to funding projects, with a focus on societal benefit versus institutional allegiance.

Opportunities:

- Solutions to shared problem spaces will often be situated outside of libraries and academia

- Innovation as rationale for partnerships, including with private sector and others outside immediate organization

6. Trend >>> Machine Learning Systems

New computing technologies will result in machine and deep learning systems replacing current approaches in numerous areas. Change is already underway in web search, image caption and data analytics. The amount and varieties of data, coupled with powerful computational methods and affordable data storage, will significantly influence areas such as scholarly output, collection analysis and personalization, among others.

Opportunities:

- New strategies for collection analysis

- Deep learning image analysis, audio analysis, network analysis

- Image captioning research, analysis and application systems

- Similarity-based search, e.g., "find things that look like this"

7. Trend >>> Information, Media and Digital Literacy

The explosion of non-traditional publications, coupled with the increased politicization of information, will amplify the need to address the deliberate proliferation of false information and the willful rejection of proven information as false or simply unknowable. Information and digital literacy – the ability to use information and communication technologies to find, understand, create and communicate credible information – will be a foundational element of higher education and a functioning democracy.

Opportunities:

- Credibility standards, schemas

- Reproducibility and replicability as a trust mechanism

- Academia as a credible source of data; brand optimization

8. Trend >>> Open Access

As the sheer volume of information expands and user expectations for unfettered access and reuse become the norm, traditional publishing business models will become unsustainable, both economically and practically. Scholarly research and output will increasingly be published and made available via alternative publishing models that support open modes of interacting with content. Funding mandates related to research data publication will continue to broaden.

Opportunities:

- Expansion of open access publishing model types

- Shift in licensing/rights management practices to encourage broader access to humanities, social science research

- Data/software/workflow publishing tools

- Transition of monographs (long form argument) to more dynamic forms

- Alternative peer review, e.g., post-publication annotation

- Publications as "living" (rather than static) documents

- OA outreach and education specifically in the context of the humanities/social sciences