

Ayala Science Library 228
University of California, Irvine Libraries
Irvine, CA 92623-9556
5 March 2014

LAUC System-wide Committee on Professional Development
c/o Nick Robinson, UC Berkeley (nrobinso@library.berkeley.edu)

My travel grant to attend the International Grey Literature Conference in Rome, Italy in November 2012 and which was funded in October 2013 took me a long while to find original receipts that were paid in September 2012. Please accept my apologies for taking until now to handle the financial closure of this account and to file a report.

As stated in the End of Funding Report that is attached, my professional experience was very positive and I accomplished more than I set out to do as this paper contributed to several subsequent opportunities and ongoing work that continues today.

I thank LAUC for making these financial resources available and am very pleased that the issues that contributed to such serious delays in funding these wonderful opportunities have been recognized and I believe resolved.

I hope that the complete documentation is sufficient to demonstrate that this was a very good outcome.

Sincerely yours,

A handwritten signature in cursive script, reading "Julia Gelfand". The ink is dark and the signature is fluid, with a long, sweeping underline that extends to the right.

Julia Gelfand
Applied Sciences & Engineering Librarian
jgelfand@uci.edu

END OF FUNDING PERIOD REPORT
LAUC Statewide Grants, Research & Professional Development Committee

Primary Applicant(s): Julia Gelfand
Campus: Irvine
Email: jgelfand@uci.edu
Telephone: 949-824-4971

TITLE OF PROJECT: Professional Development / Presentation Award /Travel Grant

Time Period of Grant: 2012-13; travel in Dec 2012
Amount of Award Received: \$293.58
Original Abstract as Submitted: Attached.

I. ACCOMPLISHMENTS and EVALUATION

- Describe what was achieved during the time period of the grant. I prepared and delivered a paper at the 14th International Conference on Grey Literature in Rome, Italy
- What aspects were completed as proposed? Everything proposed was completed. Paper was prepared; attendance at the conference and publication of the paper in conference proceedings and the *Grey Journal*.
- If your study could not be completed as proposed, explain how your plans were altered.
N/A
- Did the project accomplish what it intended? Did it make a difference?
 - Include any relevant quantitative data, if applicable (e.g. How many individuals have benefited from this project? In what way? This may include various output measures such as circulation, reference transactions, program attendance, survey responses, etc. as appropriate.) Attendance at the conference was 125 persons. Published paper was published and has been cited 4 times. Paper paved the way for future work in role of altmetrics and led ultimately to the creation of Subject Guide on Research Metrics (<http://libguides.lib.uci.edu/researchimpact-metrics>)
 - Include any anecdotes, if applicable. Increasing leadership role on impact factors from published sources
- What would you do differently next time, if anything?
- What advice do you have for others applying for LAUC research grants? Definitely submit.

II. IS YOUR PROJECT COMPLETED? Yes X No

If No, what is needed to complete the project? Is more time needed? Or more funds?

III. FINANCIAL STATEMENT

Please explain how the funds received were spent. Attach your original budget and indicate how well your estimates matched with actual expenditures. Receipts are not necessary.
Contributed to airfare and travel expenses to deliver paper at conference. See attached airline payment.

IV. SHARING YOUR PRODUCT/RESULTS

What are your plans for disseminating the results of your work? If it will be a web page or product, or published article or book, when will it be available to the public? Include citations/URLs if known.

Published in the Conference Proceedings and also in The Grey Journal 9,(1) 2013.

V. NOTE

Information included in this report may be reprinted or posted on the web for dissemination to UCOP, other UC Libraries, and future potential LAUC grant applicants.

Name	Julia Gelfand	City of Residence	Irvine
Activity	International Grey Literature Conference	Date(s) of Activity	Nov 28-29, 2012
Destination	Rome, Italy	Corporate Card Used?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>

If receipts are smaller than 8½" by 11", tape on all sides to an 8½ by 11 sheet of paper and identify what it was for.

Business Office Use Only	
Account Fund	
Approved Amount	\$
APJ Entry Date	

UCI Libraries Business Office 3/2012

Record Locator: PMZWAB



itinerary

Carrier	Flight Number	Departing		Arriving		Booking Code
		City	Date & Time	City	Time	
carrier American Airlines	2073	SANTA ANA	TUE 27NOV 8:20 AM	CHICAGO OHARE	2:10 PM	O
		Julia Gelfand	FF#: G892072 PLT	Economy	Seat 10C	Food For Purchase
carrier American Airlines	5682	CHICAGO OHARE	TUE 27NOV 4:45 PM	MADRID	7:40 AM	O
		OPERATED BY IBERIA CHECK-IN WITH OPERATING CARRIER				
		Julia Gelfand	FF#: G892072 PLT	Economy	Seat 26J	Breakfast/Lunch
carrier American Airlines	5489	MADRID	WED 28NOV 11:55 AM	ROME FIUMICINO	2:25 PM	O
		OPERATED BY IBERIA CHECK-IN WITH OPERATING CARRIER				
		Julia Gelfand	FF#: G892072 PLT	Economy	Seat 21C	
carrier American Airlines	6697	ROME FIUMICINO	MON 03DEC 8:05 AM	LONDON HEATHROW	9:45 AM	S
		OPERATED BY BRITISH AIRWAYS CHECK-IN WITH OPERATING CARRIER				
		Julia Gelfand	FF#: G892072 PLT	Economy	Seat 13C	Meals
carrier American Airlines	47	LONDON HEATHROW	MON 03DEC 1:15 PM	CHICAGO OHARE	4:05 PM	O
		Julia Gelfand	FF#: G892072 PLT	Economy	Seat 23B	Lunch/Snack
carrier American Airlines	1677	CHICAGO OHARE	MON 03DEC 7:15 PM	SANTA ANA	9:35 PM	O
		Julia Gelfand	FF#: G892072 PLT	Economy	Seat 10C	Food For Purchase

receipt

PASSENGER	TICKET NUMBER	FARE-USD	TAXES AND CARRIER- IMPOSED FEES	TICKET TOTAL
JULIA GELFAND	0012313958515-16	375.00	675.10	1050.10
Payment Type: Master Card XXXXXXXXXXXX0115				Total: \$1050.10

Baggage Information

Baggage charges for your itinerary will be governed by American Airlines
 BAG ALLOWANCE -SNAFCO-02P/AA FCOSNA-02P/AA
 1STCHECKED BAG FEE-SNAFCO-USD0.00/AA FCOSNA-USD0.00/AA
 2NDCHECKED BAG FEE-SNAFCO-USD0.00/AA FCOSNA-USD0.00/AA
 ADDITIONAL ALLOWANCES AND/OR DISCOUNTS MAY APPLY

You have purchased a NON-REFUNDABLE fare. The itinerary must be canceled before the ticketed departure time of the first unused coupon or the ticket has no value. If the fare allows changes, a fee may be assessed for changes and restrictions may apply.

One or more of your flights is a Codeshare flight and is operated by a Partner Airline. If your journey begins with a flight operated by one of American's Partner Airlines, then please check-in with the Partner Airline for that portion of your journey. Upon check-in, they will check your luggage to its final destination and provide boarding passes for your connecting flights, if applicable.

Electronic tickets are NOT TRANSFERABLE. Tickets with nonrestrictive fares are valid for one year from original date of issue. If you have questions regarding our refund policy, please visit www.aa.com/refunds.

To change your reservation, please call 1-800-433-7300 and refer to your record locator.



July 17, 2013

VIA EMAIL

RE: LAUC Grant FY 2013-2014

Dear Librarian Gelfand:

Congratulations on the award of a LAUC Presentation Grant for fiscal year 2013-2014. The Office of the President has reviewed the recommendations of the LAUC Research & Professional Development Committee and has approved funding for your presentation: *Research Life Cycle: Exploring Credibility of Metrics and Value in a New Era of eScholarship that Supports Grey Literature* in the amount of \$293.58.

Section VI FUNDING DISBURSEMENTS of the LAUC Research guidelines refers to funding disbursements:

<http://lauc.ucop.edu/committees/rpd/resguide-rev.html#disburse>

You should have your local library business office make arrangements for the transfer of the grant funds from UCOP as soon as possible. Below is information for the UCOP contact with whom your business office person should correspond for the transfer of funds:

Padona Yeung
Program Services Manager
(510) 987-9478
Padona.Yeung@ucop.edu

Please also look at section IV. J. REPORTING of the LAUC Research guidelines for the annual and final reporting guidelines (<http://lauc.ucop.edu/committees/rpd/resguide-rev.html#app>).

Let me know if you have any questions.

Best wishes and good luck with your future endeavors.

Sincerely,

Nick Robinson
Chair, 2012/2013 R&PD Committee
University of California, Berkeley
Institute of Governmental Studies Library
109 Moses Hall #2370, Berkeley, CA 94720-2370
Phone: 510-643-6429
Email: nrobinso@library.berkeley.edu

Fourteenth International Conference on Grey Literature



Tracking Innovation through Grey Literature

National Research Council, Rome, Italy 29-30 November 2012

Hosted by the Central Library "Guglielmo Marconi", IRPPS Rome, and ISTI Pisa

Conference Program

DAY TWO

POSTER SESSION AND SPONSOR SHOWCASE

9:00-11:00

SEE LIST OF POSTERS, PAGE 3 BELOW

The entrance hallway and rooms adjoining the Main Aula will accommodate up to 20 conference posters. For information on the availability of space and for further guidelines on posters, please contact TextRelease.

11:00-12:30

SESSION THREE – ADAPTING NEW TECHNOLOGIES

Chair, Daniela Luzi, *Institute for Research on Population and Social Policies, IRPPS-CNR, Italy*

An Environment Supporting the Production of Live Research Objects Massimiliano Assante, Leonardo Candela, Donatella Castelli, and Pasquale Pagano; *Istituto di Scienza e Tecnologie dell'Informazione – CNR, Italy*

Creating and Assessing a Subject-based Blog for Current Awareness within a Cancer Care Environment Yongtao Lin and Marcus Vaska; *Health Information Network Calgary, University of Calgary, Canada*

Centralised National Corpus of Electronic Theses and Dissertations Julius Kravjar and Marta Dušková; *Slovak Centre of Scientific and Technical information, CVTISR, Slovakia*

A funder repository of heterogeneous grey literature material with advanced user interface and presentation features Ioanna-Ourania Stathopoulou, Nikos Houssos, Panagiotis Stathopoulos, Despina Hardouveli, Alexandra Roubani, Ioanna Sarantopoulou, Alexandros Soumplis, Chrysostomos Nanakos; *National Documentation Centre; National Hellenic Research Foundation, Greece*

13:30-15:00

SESSION FOUR – REPURPOSING GREY LITERATURE

Chair, Bertrum H. MacDonald, *Dalhousie University, Canada*

Working for an open e-publishing service to improve grey literature editorial quality Rosa Di Cesare, Marianna Nobile; *Institute for Research on Population and Social Policies, IRPPS and Silvia Giannini; Institute of Information Science and Technology, ISTI, Italy*

Teaching and learning across national frontiers to improve dissemination of scientific research output: Is there a borderline between grey and white literature? Lessons learned from the NECOBELAC experience in Europe and Latin America Paola De Castro, *Istituto Superiore di Sanità, ISS, Italy*

Grey literature in Australian education Gerald White, Julian Thomas, Paul Weldon, Amanda Lawrence and Helen Galatis; *Australian Council for Educational Research, Australia*

Research Life Cycle: Exploring Credibility of Metrics and Value in a New Era of eScholarship that Supports Grey Literature Julia Gelfand, *University of California, Irvine (UCI)* and Anthony Lin, *Irvine Valley College, USA*

15:15-16:00

CLOSING SESSION – REPORT CHAIRPERSONS, CONFERENCE HANDOFF, FAREWELL

Chair, Stefania Biagioni, *ISTI-CNR, Italy* and Dominic Farace, *GreyNet International, Netherlands*

POST CONFERENCE TOUR - CNR CENTRAL LIBRARY

16:00-17:00

Guided by Flavia Cancedda and Luisa De Biagi, *CNR Biblioteca Centrale "G. Marconi", Italy*

GL14 Program and Conference Bureau

TextRelease

Javastraat 194-HS, 1095 CP Amsterdam, The Netherlands
www.textrelease.com • conference@textrelease.com
Tel/Fax +31-20-331.2420

Ayala Science Library 228
Univ. of Calif., Irvine Libraries
Irvine, CA 92612
10 January 2013

Nick Robinson
Chair, LAUC Research & Professional Development Committee
Library Director
Institute of Governmental Studies Library
University of California, Berkeley
109 Moses Hall #2370
Berkeley, CA 94720-2370
via Linda Murphy, UCI representative, lmurphy@uci.edu

RE: LAUC 2012-13 Presentation Grant

This letter serves as an application for two LAUC presentation grants in the program to be awarded for FY 2012-13.

In this academic/fiscal year as well as the coming one, I have had or will have professional opportunities to participate in two international conferences in which I will not receive local or campus funding and hope that this funding source will cover some of the associated expenses.

**I. Fourteenth International Grey Literature Conference, November 29-30, 2012,
Rome, Italy**

I have been professionally active in the grey literature movement for over two decades and my resume documents the many contributions I have made to the study and applications of grey literature. The paper and presentation for this conference is another timely analysis about the changes in metrics that define collection development and the impacts on the research lifecycle. I collaborated with my former colleague, Anthony (Tony) Lin and was the partner who delivered the paper, "Research Life Cycle: Exploring Credibility of Metrics and Value in a New Era of eScholarship that Supports Grey Literature," and for which the following abstract describes our work that was presented at Italy's National Research Council (CNR):

The fundamental components of the research process are defined by academic tradition, discipline and its participants. Traditional scholarship has now evolved into eScholarship with emerging technologies providing new methods of innovation and new ways of handling classical research processes. This revised research life cycle not only incorporates the established parts of the research chain, from discovery, gathering, and creating, but now has added phases of citing, sharing, preserving and archiving. There are quantifiable elements that help describe unique elements depending on sector and subject matter and format. Previously defined barriers such as geographical, institutional, digital and domain boundaries that had earlier existed can now be transcended to either accelerate or retard the research lifecycle in amazing and innovative ways. This new paradigm shift of current practices or activities today include the range of literacies that must be demonstrated and include information literacy, visual literacy, financial literacy, and increasingly data literacy. The role of the academic library has become increasingly visible as scholars and scientists seek support in managing their research lifecycle components. Librarians are now managers and curators of the scholarly research lifecycle by protecting, harvesting, and promoting reuse of content for new and unprecedented purposes. In a similar fashion, Grey Literature has previously followed the lifespan of more traditional output. Now new technologies exist to extract value metrics that compare favorably with other information

products. This paper will explore how Grey Literature matures through different pathways or life cycles as the new grey becomes less grey with metrics of increasing value to support and describe it. Also, the world of publishing has become increasingly accessible to a new population of scholars to release new information and ideas, contribute to emerging fields and frontiers without the barriers or requirements of following a specific trajectory of traditional publication processes. Examples will be shared about how the research life cycle has evolved with new tools to support Grey Literature from the life cycle management (LCM) and life cycle assessment (LCA) models to determine impacts and drive future directions concerning options for actions like open access, intellectual property and other forms of rights management.

The paper, along with the accompanying powerpoint slides, was accepted to be published in both the conference proceedings and in GreyNet's *Grey Journal* and database. In preparation for this paper and in conjunction with this work, I released a Library Guide, "Research Impacts Using Citation Metrics"

(<http://libguides.lib.uci.edu/researchimpact-metrics>)

This work supports and builds upon my primary assignment as the Applied Sciences and Engineering Librarians with responsibilities for collection development, scholarly communication and data services as they support the liaison assignments and subjects with which I work. The timetable that I worked on was that this paper was accepted in June 2012 and we began the serious research and writing in September, 2012 completing the paper in early November 2012.

The International Grey Literature movement has been active for over two decades, primarily in Europe and I have been a part of that community from its inception having presented at the first international conference in 1992 in Amsterdam and at all but four subsequent conferences. I was the founding editor of the *International Journal on Grey Literature* that was launched in 1999 but did not survive the competition of commercial journals. The majority of my research portfolio is dedicated to different scenarios of grey literature and its implications for library collections and academic services.

The projected budget summary for a \$500 award is as follows and will contribute toward the expenses associated with attending this conference:

- Roundtrip airline ticket from Orange County, California to Rome, Italy on November 27, 2012 returning on December 3, 2012 – \$1072
- Five nights hotel stay in modest lodgings in Rome – costs \$691.69
- Local ground transportation to/from airport – \$26.13 + \$63.87 = \$90
- Registration Fee for Presenter - \$505 (395 euros) – paid for by campus professional development funds
- Meals – total of \$187.35 (for 5 days)

Summary of Total Costs paid by requestor = \$2041.04

I am a member of the Bargaining Unit represented by the UC-AFT, at the Irvine campus. With the exception of those noted, no other requests for funds to cover these expenses have been made.

My attached resume highlights consistent attention to my scholarship and extracurricular activities. This is an example of ongoing activities that influence my primary professional responsibilities on a daily basis and demonstrate leadership, mentorship and other attributes that are performance related. I thank you for your consideration and assistance, and hope that you will let me know if I can provide additional information.

Sincerely yours,

Julia Gelfand
Applied Sciences & Engineering Librarian
jgelfand@uci.edu
949-824-4971

Enclosure: Resume

Research Life Cycle: Exploring Credibility of Metrics and Value in a New Era of eScholarship that Supports Grey Literature

By

Julia Gelfand
University of California, Irvine
&
Anthony (Tony) Lin
Irvine Valley College

Paper presented at the 14th International Conference on Grey Literature
Rome, Italy
30 November 2012

Abstract:

The fundamental components of the research process are defined by academic tradition, discipline and its participants. Traditional scholarship has now evolved into eScholarship with emerging technologies providing new methods of innovation and new ways of handling classical research processes. This revised research life cycle not only incorporates the established parts of the research chain, from discovery, gathering, and creating, but now has added phases of citing, sharing, preserving and archiving. There are quantifiable elements that help describe unique elements depending on sector and subject matter and format. Previously defined barriers such as geographical, institutional, digital and domain boundaries that had earlier existed can now be transcended to either accelerate or retard the research lifecycle in amazing and innovative ways. This new paradigm shift of current practices or activities today include the range of literacies that must be demonstrated and include information literacy, visual literacy, financial literacy, and increasingly data literacy. The role of the academic library has become increasingly visible as scholars and scientists seek support in managing their research lifecycle components. Librarians are now managers and curators of the scholarly research lifecycle by protecting, harvesting, and promoting reuse of content for new and unprecedented purposes. In a similar fashion, Grey Literature has previously followed the lifespan of more traditional output. Now new technologies exist to extract value metrics that compare favorably with other information products. This paper will explore how Grey Literature matures through different pathways or life cycles as the new grey becomes less grey with metrics of increasing value to support and describe it. Also, the world of publishing has become increasingly accessible to a new population of scholars to release new information and ideas, contribute to emerging fields and frontiers without the barriers or requirements of following a specific trajectory of traditional publication processes. Examples will be shared about how the research life cycle has evolved with new tools to support Grey Literature from the life cycle management (LCM) and life cycle assessment (LCA) models to determine impacts and drive future directions concerning options for actions like open access, intellectual property and other forms of rights management.

Background

Innovation is the catalyst for positive change and grey literature is the measure of benchmarks in the further process of research and development. Innovation and grey literature share parallel life cycles in which early growth is relatively slow until their use and application become recognized both within and later beyond their community of origin. Expected top-line growth and increased bottom-line results are achieved in part through new technologies, through redeployment and enhancement of existing products and services, which at times are unachieved. Nevertheless, the process shared by innovation and grey literature carries on with analogies to product life cycle management strategies. If grey literature is considered a product, and business or industry the context, then the conditions in which it is developed, tested, applied and sold becomes its lifecycle and changes over time. Product life-cycle management (PLC), often known as marketing include stages such as analyzing the time to market, improving product quality; and considering ways to penetrate new markets, reach new customers and develop new applications. In our contemporary environment, software and technology play important roles in determining the lifespan and obsolescence of any product.

Research is an abstract environment and has many different components but studied in its most benign and natural state, one can assume that research generates products, births new knowledge and engages in a re-engineering process while confirming the following assumptions:

- Every product has a defined life cycle and a limited life
- Sales and marketing require different passages, and both challenges and opportunities are presented to the distributor or seller

- Each life cycle stage demands attention to marketing, financing, manufacturing, purchasing and other strategies to support it successfully

This can be demonstrated by the main stages of a product's life cycle:¹

1. Market Development – full of unknowns, uncertainties; trying not to prematurely fold
2. Growth – responds to consumer demand/interest; develop brand loyalty over other products; establish pricing
3. Maturity – responds to competitive intelligence; requires creative marketing, communication with users or customers
4. Decline (saturation) – over capacity is usually the result of this stage but it can be a positive outcome with prices and margins reduced diverting the decline with a more creative force.

Again, we confirm that innovation is never easy – the population must perceive that it needs and wants a product or service. The more unclear or new it is, the more challenging it is to enter the mainstream.

Research Life Cycle

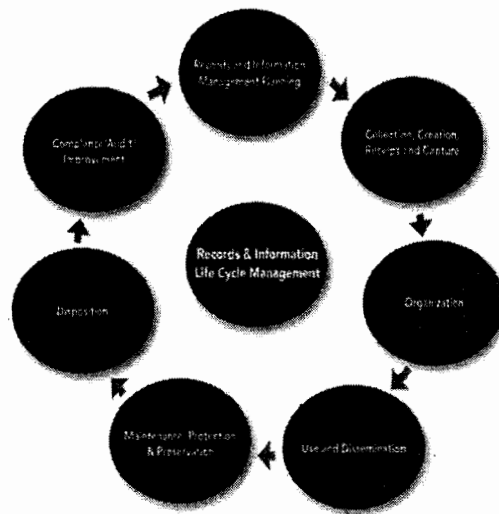
The research lifecycle appears to be measured in different ways. It also refers to different elements in the research chain. In the framework of assessing outputs, one traditionally uses metrics that reflect the activity of the author or contributor, what the product is and how it is cited to determine the value it has to a user, subscriber, or to a more general audience. Libraries have increasingly become engaged in assessing the value of their collections and the source of their resources. Research generates many different products and services, but in library-speak, they tend to be universally described as information sources.

The Library and especially the digital library environment that organizes information have become increasingly central to the research process. The scholarly communication pipeline as it has been referred to at conferences, especially the future of scientific communication has been the focus of all stakeholders representing scientists and scholars, librarians, publishers, technologists who are exploring “how to create continuity across the entire ecosystem and give the scientific community the ability to observe or participate wherever they need to in that ecosystem, ...by filling the need for better filtering.”² The added value of providing a structure to find and store research products or outputs, and as a source for discovering new research trends or evaluating research excellence and thus improve the process of how research is conducted. These values are increasingly part of a new research landscape covered by meetings now held worldwide to help advance publishing, research sharing, informatics, data analysis and hopefully develop new technologies and products to expand the research of research.³

“Life cycle management (LCM) is a business management approach that can be used by businesses and organizations to improve products and performance of those companies or institutions involved in production and thus can be used to target, organize, analyze and manage product related information and activities towards continuous improvement along the life cycle.”⁴ Also it can be simply described as “a framework to analyze and manage the sustainability performance of goods and services.”⁵

An example, or one model that diagrams this for the information industry may be something like this:

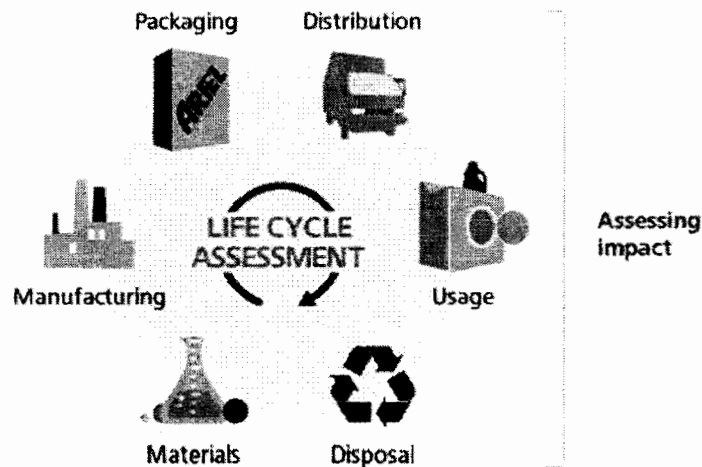
Lifecycle Management



<http://www.gallegoinfo.com/content/pages/lifecycle-management>

Life cycle assessment (LCA) involves “implementing standards, metrics, procedures and inventory data for the social dimension of sustainability”⁶ creating a community that can vet and compare data elements or social indicators as part of this process. With roots in environmental standards, it allows providers a means to improve resource efficiency. It can be extended to information products or resources by adding a social life cycle assessment, (S-LCA) that “can be used to assess the social aspects of products and their potential positive and negative impacts along the life cycle.”⁷

What appears to be critical is to know that in addition to LCM and LCA approaches, there are a wide variety of other tools that are used to understand the transition from LCM to LCA or management to assessment. This chain includes the actions of discovery, gathering, and creating, but now has added phases of citing, sharing, curating, preserving and archiving the content whether it be text, images, data, 3D objects, media, etc. This can correspond in the information industry and work of librarians to be part of the scholarly communication model, building out current service emphases of information literacy, outreach, instruction, digitization and the most recently launched data management/curation programs.



Research and scholarship are independent activities that define the academic experience and contribute to creativity and innovation. In recent years, the concept of “knowledge generation” has been applied to the outputs and the goals of research.

When libraries are trying to forge ahead increasing the digital footprint and aligning services to support eResources, the quandary became more complicated this year, as publishers raised the price of eBooks to libraries, and consortia struggle to find ways to reduce unit costs by multi-institution buying plans. This is a serious detour in the research lifespan.

Definition of Innovation

Standard dictionary definitions of the verb innovate include: “make changes in something established, especially by introducing new methods,” or “something different that has impact.”⁸ In order to study or evaluate innovation, some business executives or analysts may consider the context as being one of “perpetual change,” and the “imperative of today’s times;” and ways to categorize innovation as by the “innovation’s strategic intent” or examining the “type of innovation.”⁹

Innovation comes in many shapes and sizes with different forms of influence. It is never easy and the population or users must perceive that it needs and wants a product. The more unclear or new it is, the more challenging it is to enter the mainstream and be accepted. The research environment attempts to consider things in a transformational way, again by weighing the impact over time. To understand innovation and see how it plays out, it is critical to determine and anticipate the desired outcome. This can be done by considering three types of innovation:

- Continuous innovation – suggests incremental changes or improvements and is “a common way to satisfy existing customers while grabbing new users.”
- Dynamically continuous innovation – represents a change in the way we use a product without changing the technology behind the product all that much
- Discontinuous innovation – requires a significant behavioral change but is not synonymous with disruptive innovation because that causes immediate changes while discontinuous innovation may take significantly longer to influence change.¹⁰

Certain types of innovation require more resources, time and energy from an organization than others and will determine how to select the right type of innovation to fit the appropriate commitment level.¹¹

“The world no longer cares about what you know; the world only cares about what you can do with what you know,” writes Tony Wager, Innovation Education Fellow at Harvard’s Technology and Entrepreneurship Center, and author of the recent release, *Creating Innovators: The Making of Young People Who Will Change the World*.¹² This book is innovative in itself as its promotion is available in multiple formats inviting discussion and commentary. (see <http://creatinginnovators.com/>). It states that innovation is dependent upon a skillset, learning style, and keeping up with change. It is inevitable that subsequent generations of students and thus workers will have a different skillset than current employees and the transition to a different work life and organizational culture will continue to be challenging for some time, as new members of the workforce appear to have a different, more technology intensive background.

Innovation in Higher Education – with extensions to libraries

With the recent budgetary challenges, the field of higher education needs to invest in innovation to find solutions to long standing problems. Never easy, the word “innovation” can be used in many different ways. In the *Future of University Libraries: 2012 Midwinter Report*, citations to several examples of entrepreneurial action point to how libraries are:

- demonstrating value
- rethinking library services
- reconfiguring library spaces
- preparing psychologically for the future.¹³

James Neal, Vice-President for Information Services and University Librarian at Columbia University suggests that research libraries of today and the future are “more entrepreneurial organizations, more concerned with innovation, business planning, competition and risk, leveraging assets through new partnerships to create new financial resources.”¹⁴

If innovation can be classified into two basic types, administrative and technical as it describes innovation in organizations such as libraries, then two stages may emerge, 1) initiation and 2) implementation each with its own substages that form what Jantz calls an innovation process model with four major construct groups:

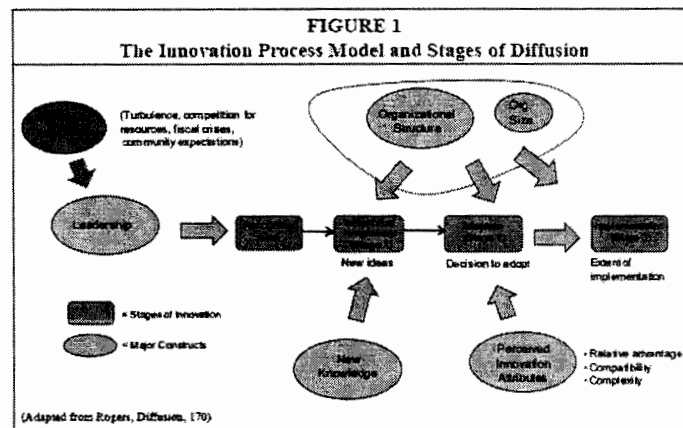
1. leadership
2. new knowledge
3. organizational structure
4. perceived innovation attributes.

The substages for initiation are:

- knowledge awareness substage
- attitude formation substage
- the decision substage

and the substages for implementation:

- initial implementation substage
- continued sustained implementation substage¹⁵



Perhaps this sets us up for the prediction made by Daniel Greenstein in 2009, “The university library of the future will be sparsely staffed, highly decentralized, and have a physical plant consisting of little more than special collections and study areas.”¹⁶ This scenario he describes is already a truism as budgets decline to support library collections and associated services are reconfigured to offer greater access via more remote connections and library reorganizations tackle how best to meet ongoing service and information needs. Extending the reference to a research context, Christine Borgman has stated, “the role of libraries in research institutions is evolving from a focus on reader services to a focus on author services.”¹⁷

Unique to the United States: The Community College Experience

In a one-year study completed by O'Banion, T. & Weidner, L. (2010), *The nature of innovation in the community college*, the authors examine community college views of innovation in higher education. The community college movement got its stride in the 1960s in the United States when divisions between higher education sectors were defined. Community colleges allowed students to fulfill their core

competencies with an A.A. degree before matriculating in a baccalaureate degree program, or gain vocational or specialized expertise and credentials. Today, community colleges are providing a critical and necessary function in higher education as students and their families are facing increased tuition and fees, are less mobile, where the emphasis is on teaching and learning outcomes, the greater demand for new skills in the workforce and lifelong learning is at an all time peak. O'Banion and Weidner found after examining hundreds of statements on the definition of innovation in both higher education and business, all definitions of innovation led to this fundamental concept, "a creative process that results in an improved product."¹⁸ Among the other definitions of innovation include the following:

The development or adoption of new or existing ideas for the purpose of improving policies, programs, practices, or personnel	25	25.0%
The creation of new opportunities that are transformative	25	25.0%
The development of new or existing ideas for the purpose of improving policies, programs, practices, or personnel	20	20.0%
The creation of new opportunities that are transformative	20	20.0%
The development of new or existing ideas for the purpose of improving policies, programs, practices, or personnel	15	15.0%
The creation of new opportunities that are transformative	15	15.0%
The development of new or existing ideas for the purpose of improving policies, programs, practices, or personnel	10	10.0%
The creation of new opportunities that are transformative	10	10.0%
The development of new or existing ideas for the purpose of improving policies, programs, practices, or personnel	5	5.0%
The creation of new opportunities that are transformative	5	5.0%
The development of new or existing ideas for the purpose of improving policies, programs, practices, or personnel	5	5.0%
The creation of new opportunities that are transformative	5	5.0%

Source: O'Banion, T. & Weidner, L. (2010)

The two most commonly expressed ideas were "The development or adoption of new or existing ideas for the purpose of improving policies, programs, practices, or personnel" and "The creation of new opportunities that are transformative".¹⁹

Institutional barriers to innovation

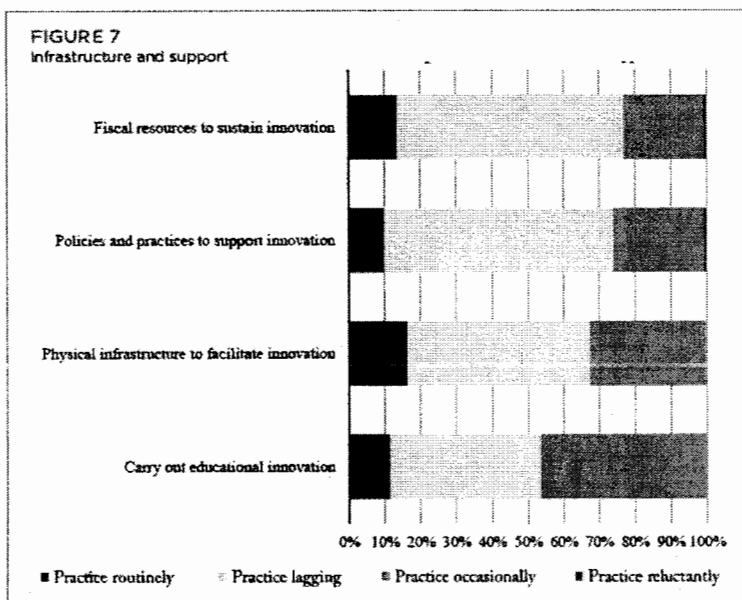
Institutional support from a college administration is the most important source for responding to institutional needs. It is logical to conclude that at the research university level, that these more complex institutions would place a much higher emphasis on innovation than their community college counterparts. However, evidence largely parallels their community college findings. In a report issued by the American Society for Engineering Education (ASEE), fiscal resources to sustain innovation and policies and practices to support innovation were shockingly low. The report also states that "This is mostly good news in that the faculty committees and administrators generally want to increase their involvement in educational innovation. They just do not feel that they have the policies, practices, resources, and infrastructure they need to be more successful."²⁰

In contrast to O'Banion and Weidner, the ASEE report tends to take a more holistic approach to creating a culture of innovation in their engineering institutions. Both groups stress the need for partnerships and teamwork, securing administrative support for innovation, and assessment. The ASEE takes their recommendations one step further by integrating them into the "pre-professional, professional, and continuing education of engineers."²¹

**RECOMMENDATIONS FOR CREATING A CULTURE FOR SCHOLARLY
AND SYSTEMATIC INNOVATION IN ENGINEERING EDUCATION:
GOING FROM INNOVATION TO INNOVATION WITH IMPACT**

1. Value and expect career-long professional development programs in teaching, learning, and education innovation for engineering faculty and administrators, beginning with pre-career preparation for future faculty.
2. Expand collaborations and partnerships between engineering programs and (a) other disciplinary programs germane to the education of engineers as well as (b) other parts of the educational system that support the pre-professional, professional, and continuing education of engineers.
3. Continue current efforts to make engineering programs more engaging and relevant, and especially expand efforts to make them more welcoming.
4. Increase, leverage, and diversify resources in support of engineering teaching, learning, and educational innovation.
5. Raise awareness of the proven principles and effective practices of teaching, learning, and educational innovation, and raise awareness of the scholarship of engineering education.
6. Conduct periodic self-assessments within our individual institutions to measure progress in implementing policies, practices, and infrastructure in support of scholarly and systematic innovation—innovation with impact—in engineering education.
7. Conduct periodic engineering community-wide self-assessments to measure progress in implementing policies, practices, and infrastructure in support of scholarly and systematic innovation—innovation with impact—in engineering education.

Source: Innovation with impact (2012).



Source: Innovation with impact (2012).

In comparison, the successes and barriers to innovation as noted by community colleges include the following:

	Number of Responses	Percent of Responses
1. Lack of time	100	34.3%
2. Lack of resources	85	29.3%
3. Lack of knowledge	75	26.0%
4. Lack of institutional support	65	22.5%
5. Lack of funding	55	19.0%
6. Lack of leadership	45	15.7%
7. Lack of communication	35	12.1%
8. Lack of incentives	25	8.7%
9. Lack of collaboration	15	5.2%
10. Lack of evaluation	10	3.4%
11. Lack of training	5	1.7%
12. Lack of motivation	5	1.7%
13. Lack of vision	5	1.7%
14. Lack of commitment	5	1.7%
15. Lack of innovation	5	1.7%
16. Lack of creativity	5	1.7%
17. Lack of risk-taking	5	1.7%
18. Lack of leadership	5	1.7%
19. Lack of communication	5	1.7%
20. Lack of funding	5	1.7%
21. Lack of knowledge	5	1.7%
22. Lack of time	5	1.7%
23. Lack of resources	5	1.7%
24. Lack of institutional support	5	1.7%
25. Lack of funding	5	1.7%
26. Lack of leadership	5	1.7%
27. Lack of communication	5	1.7%
28. Lack of incentives	5	1.7%
29. Lack of collaboration	5	1.7%
30. Lack of evaluation	5	1.7%
31. Lack of training	5	1.7%
32. Lack of motivation	5	1.7%
33. Lack of vision	5	1.7%
34. Lack of commitment	5	1.7%
35. Lack of innovation	5	1.7%
36. Lack of creativity	5	1.7%
37. Lack of risk-taking	5	1.7%
38. Lack of leadership	5	1.7%
39. Lack of communication	5	1.7%
40. Lack of funding	5	1.7%
41. Lack of knowledge	5	1.7%
42. Lack of time	5	1.7%
43. Lack of resources	5	1.7%
44. Lack of institutional support	5	1.7%
45. Lack of funding	5	1.7%
46. Lack of leadership	5	1.7%
47. Lack of communication	5	1.7%
48. Lack of incentives	5	1.7%
49. Lack of collaboration	5	1.7%
50. Lack of evaluation	5	1.7%
51. Lack of training	5	1.7%
52. Lack of motivation	5	1.7%
53. Lack of vision	5	1.7%
54. Lack of commitment	5	1.7%
55. Lack of innovation	5	1.7%
56. Lack of creativity	5	1.7%
57. Lack of risk-taking	5	1.7%
58. Lack of leadership	5	1.7%
59. Lack of communication	5	1.7%
60. Lack of funding	5	1.7%
61. Lack of knowledge	5	1.7%
62. Lack of time	5	1.7%
63. Lack of resources	5	1.7%
64. Lack of institutional support	5	1.7%
65. Lack of funding	5	1.7%
66. Lack of leadership	5	1.7%
67. Lack of communication	5	1.7%
68. Lack of incentives	5	1.7%
69. Lack of collaboration	5	1.7%
70. Lack of evaluation	5	1.7%
71. Lack of training	5	1.7%
72. Lack of motivation	5	1.7%
73. Lack of vision	5	1.7%
74. Lack of commitment	5	1.7%
75. Lack of innovation	5	1.7%
76. Lack of creativity	5	1.7%
77. Lack of risk-taking	5	1.7%
78. Lack of leadership	5	1.7%
79. Lack of communication	5	1.7%
80. Lack of funding	5	1.7%
81. Lack of knowledge	5	1.7%
82. Lack of time	5	1.7%
83. Lack of resources	5	1.7%
84. Lack of institutional support	5	1.7%
85. Lack of funding	5	1.7%
86. Lack of leadership	5	1.7%
87. Lack of communication	5	1.7%
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94. Lack of commitment	5	1.7%
95. Lack of innovation	5	1.7%
96. Lack of creativity	5	1.7%
97. Lack of risk-taking	5	1.7%
98. Lack of leadership	5	1.7%
99. Lack of communication	5	1.7%
100. Lack of funding	5	1.7%

Source: O'Banion, T. & Weidner, L. (2010)

Interestingly enough, lack of resources was not the main source of barriers for innovation at the community college level. The main road block was "lack of time," and is understandable due to declining budgets, decreased staffing levels, and an increase of duties for the remaining faculty who have to teach larger enrollments, more sections with less support. Often innovation is thought of as an investment in time when the institution can dedicate resources to innovate. However, in a time strapped environment, people are focused in a reactive planning mode versus a proactive strategy.

Comparing higher education realms

Paradoxically, at the four-year research university level, the main barrier to innovation was "resources." This was consistently cited by faculty and academic leaders. Workload, the main barrier for community colleges, was listed towards the middle of the five challenges among this group.

TABLE 1 Top Five Challenges and Opportunities					
Challenges					
Faculty	Count	Chairs	Count	Deans	Count
Resources	46	Resources	36	Resources	19
Rewards	37	Rewards	29	Workload	17
Workload	36	Workload	27	Rewards	16
Awareness of Innovations	18	Tech. Research Emphasis	13	Innovation Not Valued	12
Assessment of Innovations	18	Changing the Curriculum	12	Resistance to Change	10
		Awareness of Innovations	12		
Opportunities					
Faculty	Count	Chairs	Count	Deans	Count
Faculty Development	16	Faculty Commitment	24	Rewards	21
Rewards	15	Faculty Development	18	Changing the Curriculum	18
Industry & Entrepreneurship	12	Awareness of Innovations	15	Collaborating with Others	15
STEM Centers	10	Innovative Pedagogy	15	Faculty Development	14
Resources	7	Rewards	12	Instructional Innovations	14
Changing the Curriculum	7				

Source: Innovation with impact (2012).

The community colleges and research universities both have different approaches to foster innovation in higher education. The community colleges tend to focus on a narrower approach that is defined within the community college framework:

- Demonstrate a need.
- Develop a vision and a plan.
- Put the plan into action.
- Talk with colleagues.
- Build a team.
- Secure administrative support.
- Dedicate the required time and effort.
- Evaluate the innovation's effectiveness.
- Tie the innovation to the college mission, values, and goals.
- Take risks.
- Plan for sustainability of the innovation.

Promoting innovation through assessment

By far the most surprising finding in the O'Banion and Weidner study is the question "How do you know that the innovation had an impact?" The most popular response was "Faculty/staff testimonies or anecdotes" followed by "Student testimonies or anecdotes". This is rather disappointing considering how in today's movement of student learning outcomes and evaluation, there is little to no formal planning or assessment to measure the success or failure of a particular innovation project. At the same time, this could also be explained by the "lack of time" previously mentioned in the survey since community colleges are many times in a reactive "firefighting" mode that will leave little to no time left for proactive, evidenced based planning and outcomes.

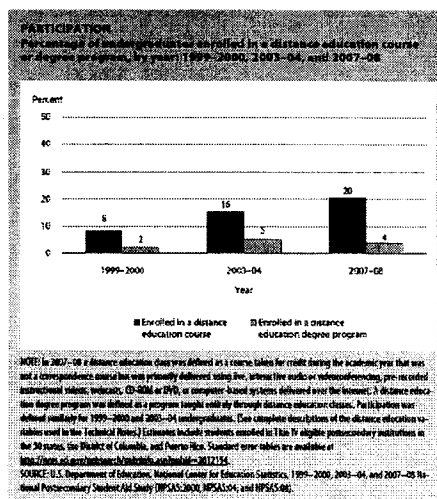
This kind of information gathering, or research findings, can be described as a form of grey literature or social networking and includes these elements.

	Number of Responses	Percent of Respondents
Individualized instruction is preferred	83	58.3%
To learn, students have to participate	81	56.1%
Students learn best	79	54.3%
Students work best	78	53.5%
Students participate in a study group	74	50.7%
Individualized instruction is more comprehensive than other student study	70	47.9%
Students learn best in a study group	67	45.4%
Other	26	17.7%
Students are not sure about	17	11.5%
Students learn simply best without	15	10.0%
No formal or informal individualized (one-to-one) instruction	11	7.5%
Top of individualized instruction is other management tools	8	5.4%
Total	142	100%

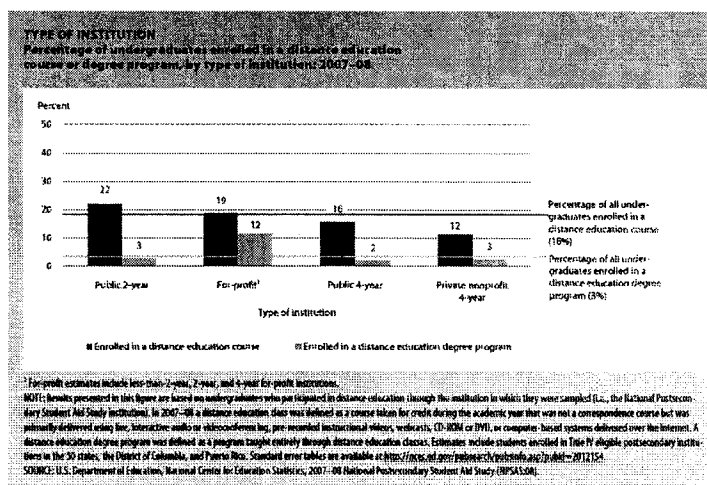
Source: O'Banion, T. & Weidner, L. (2010)

Innovations in Higher Education – Distance Education

With the nature of higher education changing from the physical classroom to the online environment, the popularity of distance education has increased in recent years not only in the United States, but globally as students enroll in courses and programs at institutions around the world without ever leaving home. According to the most recent report by the US National Center for Education Statistics, the percentage of undergraduates enrolled in a distance education course has grown from eight percent in 1999 to almost 20 percent in 2008, with variances across the higher education spectrum.²³



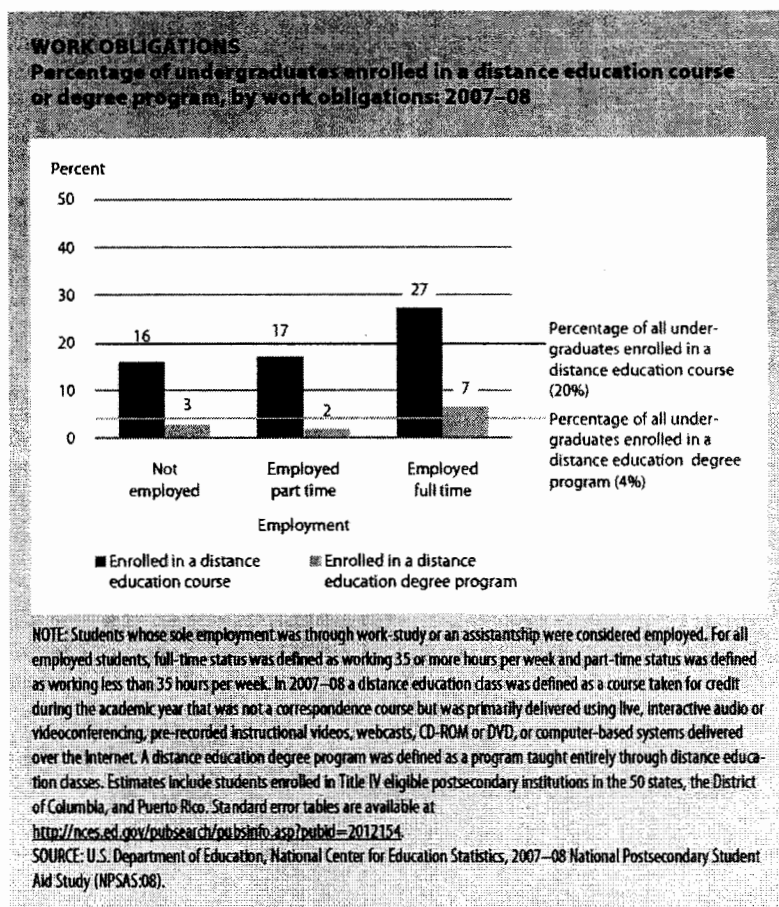
Furthermore, the breakdown of students enrolled in distance education courses from a US public 2 year institutions was at a surprisingly high 22 percent compared to their public 4 year university counterparts at 16 percent.²⁴ The private 4 year non-profit universities were not as inclined to have distance education courses at this time since only 12 percent was reported. This gap may be narrowing as new and emerging technologies have become more evident in the past 3-4 years; it is safe to assume that from 2008 that these figures have increased overall for all categories of distance education.²⁵



There are a variety of reasons why Distance Education has enjoyed an exponential increase in popularity over the past decade. The most salient reason is cost, as higher education institutions grapple with leaner budgets, increasing staff costs, and decreasing support from public funding sources. Providing distance education is one way to trim costs as Distance Education courses require no physical space to teach courses; a higher number of students enroll without impacting space constraints on campus facilities; in extreme circumstances the professor can telecommute from her/his home negating the need for a physical office on-campus, and the asynchronous learning environment of Distance Education courses allow colleges to decrease the number of on-campus courses while providing the maximum flexibility for both students and faculty.

For students, the benefits and personal convenience of Distance Education are equally numerous as the asynchronous nature of Distance Education allow students to take courses and study at their own pace. This is especially attractive for students who work full-time and can take advantage of Distance Education courses by studying and completing the coursework before and after their jobs. According to the National Center for Education Statistics, nearly 27 percent of undergraduates who were employed full-time took

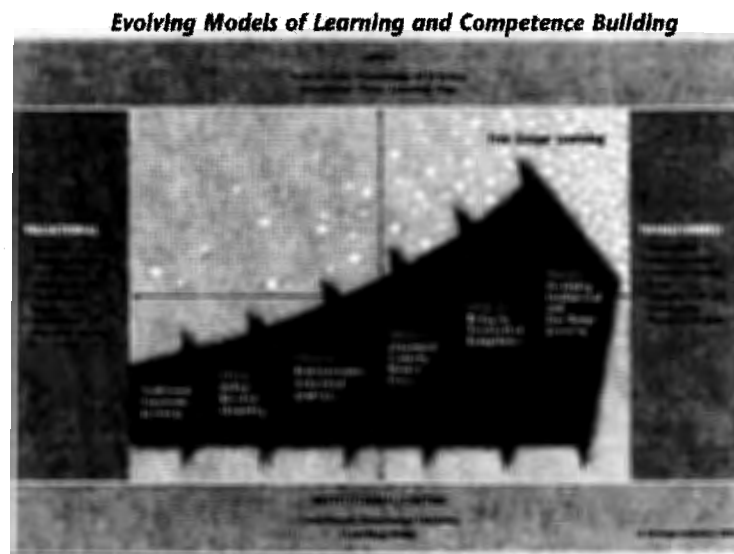
Distance Education courses compared with 17 percent for part-time workers and only 16 percent for those not employed.²⁶



Learning online

Today we are in a transitional phase in higher education, a shift away from traditional paradigms of brick and mortar learning and breaking through to online learning environments that have virtually no boundaries. Norris and Lefrere identified five phases of Distance Education environments that lead to an evolution of online learning from the traditional physical classroom setting to a peer-to-peer learning system that is accredited by specialized bodies.²⁷

As shown in the figure, there are four quadrants: on the left represents the traditional learning environment of bundled learning and assessment, on the right represents the “transformed” learning environment of unbundled learning and value focused coursework. On the bottom we see the “Institutional-centric” learning environment of traditional class-based learning vs. the open learning environment of peer-to-peer learning. As we move from the right to the left, we note that in Stage I is the start of most Distance Education programs that “digitize” the traditional learning environment through hybrid classes (a continuum of traditional classroom and online coursework), as we move towards the right Norris and Lefrere state that the Distance Education environment, specifically online learning, will evolve into a system where peer-to-peer learning is commonplace with institutional certification boards providing the levels of certification demonstrating competence in a particular field of study.²⁸



Source: Norris and Lefrere, 2011

Norris and Lefrere note the following:

Universal web access supports a shift toward greater reliance on informal local communities of practice and web-based and cross-border knowledge-sharing, and a shift away from peer-reviewed articles as the definitive source of accounts of experiences of successes in online learning and in the early adoption of transformational innovations at the course or subject level.

In other words, as we transition from Stage I towards Stage V, there will be a greater reliance on grey literature rather than the traditional peer-reviewed articles that are pervasive in traditional academic settings. Rather than relying on editorial boards and publishers to evaluate the level of scholarly information, the future will rely on practice-based and collaborative knowledge communities that transcend borders and the traditional academic boundaries of scholarly information sources. As time goes on, grey literature will become more important and proliferate in the Distance Education environment due to the universal access to of publication, the speed of producing a finished product, and harnessing the practice-based knowledge of experts in the field that are not traditionally tied to the peer-review environment. However, it is possible that peer-reviewed literature will continue to evolve into a format that is certifiable for the accreditation institutions to base the levels of competence in Norris and Lefrere, Stage V Distance Education institutions.

Grey Literature as distance education matures

Five years ago I presented at the Grey Literature conference how technology and other elements of cyberinfrastructure, specifically distance education, impacted the maturity of grey literature.²⁹ With more ubiquity, a growing dependence on networking, and an infrastructure now to support a full industry of home schooling for the K-12 cohort, the latest evolution is the massive open online course or MOOC. 2012, known to be the “Year of the MOOC” is where we see traditional online courses where tuition and fees were charged for credits that translated into degrees, give way to the usually free, credit-less and massive enrollments of tens or hundreds of thousands of students taking a given class. All that is required is an internet connection and due to the large enrollments relationships with instructors are indeed different. The course delivery, methods of interaction, and student engagement are what contribute to the success of the course, and communities evolve to foster that with the support of social media directing a framework of options for students to collaborate and congregate to share the learning experience. Lectures still are the central core but the rollout will take elements from entertainment, especially gaming and social networking to facilitate the conversations, exchanges and dialogues course content should stimulate. Many questions

remain about the efficacy and how to handle cheating and plagiarism, how to scale learning this way, whether it can translate into degree programs, global registration and how credits will be earned and students will record such registrations and experiences. Currently three major platforms exist for massive open online courses, edX, Udacity and Coursera³⁰ and each of them has their own “flavor” indicating subject orientation, technology focus and directives. Some top, prestigious academic institutions continue to partner with innovators in industry to bring this form of instruction and learning to the mainstream, and since it remains a “work in progress,” with “many kinks” it is premature to suggest what role it will play in coming years in higher education. We can speculate that it may have a role for the Emeriti Colleges, for lifelong learning and other continuing education roles but will it assume a place in post-secondary higher education as we currently know it?

Assessing consumer needs: the academic experience

With the current generation of students as digital natives, their customs and expectations, according to a new edition of, *Generation on a Tightrope: A Portrait of Today's College Student*, are grounded in technology, they appear pragmatic, concerned about their future and jobs, have a more global interest, but act locally and deal with diversity by claiming to want to live in a networked world but many of their associates, including parents and teachers are analog or digital immigrants. Students struggle with face-to-face relationships and prefer communicating via texting and choose to “hook up” but not with a lot of talking, yet a more open communication system exists but the bond with parents is tighter than they want to admit, suggesting less independence, probably due to longer financial and residential dependency. They are part of a transformation to a new and diverse digital economy, where students appear to want convenience, service, quality and lower prices in all aspects of their daily lives, including their education.³¹

Students as consumers are an important population demographic thing to focus on. Not only by age, but it is taking longer to matriculate and graduate, students are attending multiple institutions in seeking credits for their degrees, and in several different educational settings and domains as the undergraduate career can be spent at all of the forms of higher education, due to transfer status and concurrent registrations, community college, a liberal arts institution, a research university and a distance education option from yet another discrete campus.

The 18-25 age cohort may be the largest concentration of any student group, but there are many older students returning to university, continuing their studies, beginning new programs, and seeking new academic training. Serving the needs of military veterans and more international students are examples of the extended services campuses must offer today.

Examining the Beloit College Mindset data, demonstrates how important it is for faculty to know who their audience is. Conducted annually since 1998, this review is a “look at the cultural touchstones that shape the lives of students entering college each fall.”³² The takeaways are how connected this generation is with their peers and family, how important hand-held devices and technologies are and how committed they are to cultural diversions, a healthy lifestyle and good eco-values.



The student community is a combination of millennials, boomers, Gen Xers and others surveyed by the Pew Research Center trying to better understand how generations differ. According to Pew, “age group differences can be the result of three overlapping processes:

1. Life cycle effects – becoming more like their parents once they themselves age
2. Period effects – affected by major lifetime events, catastrophes and breakthroughs
3. Cohort effects – how period events and trends leave specific impressions as youth are still developing core values³³

The influence of social media on organizations and research

It has been stated that using “a defined approach to manage social media can stifle innovation and creativity.”³⁴ Some key factors that Bradley and MacDonald introduce to make mass collaboration an organizational capability include the premise that, “an organization becomes a social organization when it discovers the power of mass collaboration and develops the necessary corporate skills to address challenges by readily and repeatedly creating collaborative communities.”³⁵

- Understand when community collaboration is appropriate
- Know where community collaboration is more likely to deliver value
- Apply an understanding of your organizations goals and culture
- Craft an organizational vision for community collaboration³⁶

The principles of mass collaboration and social organizations and the management guidance each requires are:

- Participation – encourage contributions from across community and make it safe by discouraging destructive and dysfunctional behaviors and promoting productive ones
- Collective – ensure results by reaching consensus and taking action together
- Transparency – use most accurate and appropriate information; encourage openness and inclusivity
- Independence – encourage and facilitate multiple viewpoints and broader perspectives
- Persistence – keep collaborative content, contributions, feedback and decisions with the social media platform and easily available to community members
- Emergence – concentrate on community results rather than controlling the means of producing those results. Defining terms of engagement may compromise community contributions.³⁷

Social media practices - innovation strategies

Collaboration and social networking reduce a range of geographical, institutional, hierarchical, and digital barriers and promote implementing technology to bridge those structural silos. Within the information and

higher education sectors, the more technology centric publishing, libraries and information distribution can become; the more likely that the research lifecycle will be impacted by improved access. Still a business enterprise, these services will benefit from more Open Access / Open Source content and the promotion of information sharing, repurposing and reuse of content.

On a global scale the ICT environment that is defined by “Information and Communications Technology” reaffirms that there are internal stakeholders of leaders, customers and support staff plus the network of external sources, vendors, customers, officials, lenders and media who also contribute to the success of innovation. With the flattening of the world, global geography is smaller and reachable via same time communication technologies. World events are shared within moments across the globe, introducing and displacing innovation all at the same time. In higher education, the customer may be the student, the innovator may be the faculty or scholar, the product is the learning outcomes, teaching and scientific methods that are advanced.

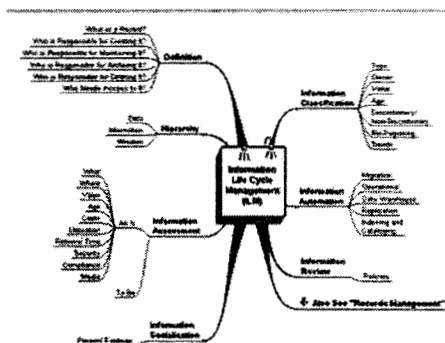
Many organizations are now using and relying upon social networking tools to reach out to all constituencies and solicit innovative ideas from them. The literature and media refer to ICTs as the method by which groups create and vent ideas – without a culture that supports ideation, innovation is challenged. Social ideation is an extension of engagement that encourages the use of social media internally so that colleagues can share ideas with each other and also can communicate externally with outsiders for more input and follow through.

More techniques and tools – leading to greyness

Social media can also encourage the use of crowdsourcing, the outsourcing of tasks to the external masses that are typically performed by internal employees or those close to the job.³⁸ This may be simpler than engaging research firms to conduct surveys, monitor and track consumer behavior. It also builds on the semantic enrichment of scientific publications and efforts of text-mining.³⁹

Another method of gaining insight into the innovation process is the more academic version of storyboarding, a technique that has its roots in filmmaking and allows for groups of people to discuss sequencing and the narration of events. Somewhat related to the ethnographic analysis an anthropologist or social scientist may pursue when they study specific populations and cultural norms, these techniques utilize questions and answers, observation, surveying and other information gathering methods to gain insights about ideas, actions and activities. This can be applied to organizational settings to outline an acquisition, define an entry into a new market or movement of people, or to measure change.

Mind mapping is a tool that explores relationships, and ideas or connections are strung together by the power of the relationship. This visible interconnectedness illustrates potentially innovative ideas that can fix, remedy, re-engineer, and stimulate new ways to go forward and contribute a product or methodology.



A wordle has become an accepted simplified, randomly and spontaneously software generated “mindmap” of concepts minus the relationships but releases a summary of covered ideas.

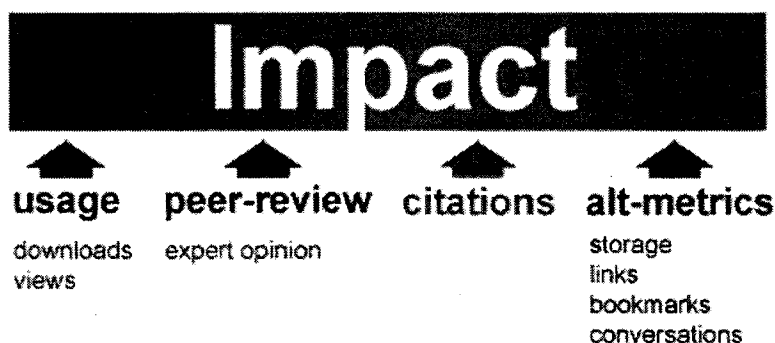


Byproducts of the research lifecycle

An environmental scan of products that document the research lifecycle suggests that there are a growing number of resource formats. Organizing and measuring various impacts are a common theme. Market penetration and other business and management themes are reflected in each of these byproducts of the research lifecycle. There are various forms of intellectual property. The release of constant new products measures productivity, commercial success and ultimately, innovation. The international stage promotes the global importance that each of these play flattening the world and reducing deficits of time. Examples are:

- Intellectual Property & Patents – greater global contributions
- Industry Standards – by certifying organizations - in the information industry with examples from ISO, NISO, OASIS, ANSI, and closed and emerging standards from the W3C (World Wide Web Consortium) and those maintained by the Society of Scholarly Publishing⁴⁰
- Library Standards – based on literacies and created by professional societies (ACRL Professional Standards)⁴¹
- Benchmarking
- Social media – multiple ways to connect, view, contribute, participate, respond to issues of the day
- ICT channels – communications, news outlets, visual content, archiving
- New & multiple formats responding to user preferences and marketplace shifts focusing on digitization
- Publishing and Usage Metrics, Bibliometrics and Altmetrics

The academic community has always evaluated its members, both institutions and individuals by determining the rankings, reputation and success of its creators and increasingly on the commercial potential for those ideas and products. In their own way, each of these establishes new separate communities where there is an element of competition, sharing, informing, educating, that takes place.



(<http://altmetrics.org>)

Within the spectrum of innovation, several metrics are critical to the research lifecycle. Most scholars are familiar with the impact factor, coined by Eugene Garfield in the early 1960s when he founded the Institute of Scientific Information in Philadelphia and birthed the products, *Science Citation Index*, *Journal Citation Reports* morphed into other larger and more interdisciplinary products that tracked impact by individual article, author and publication. The measurement of overall scholarly impact, bibliometrics as a tool and science was defined by Alan Pritchard in 1969 as, “the application of mathematics and statistical methods to books and other media of communication.”⁴²

The expanding Altmetrics movement, defined as “the creation of new metrics based on the social web for analyzing and informing scholarship”⁴³ is just a few years old and gaining momentum with activists Jason Priem and Heather Piwowar directing much of the development, especially with her development of ImpactStory and her blog, ResearchRemix.⁴⁴ Altmetrics provides not just counts and cumulative totals, but rich metadata.⁴⁵ Citation analysis has driven the method of how the scholarly community attributes value to information. We can conduct literature searches by not only examining retrospective contributions but forward tracking by citation in different formats. Increasingly indexing now covers data elements, illustrative content as well as print. With the scholarly community focused on journal literature, the article and conference paper/proceeding has always been vital to track and follow. This gives insights into what defines competitive journals that publish the most important content critical to interested readers; and determines the lifeline of the journal, its cost and role in a subject. In addition to metrics associated with authors, content, institutional rankings, benchmarking and reputation, there are also methods for assessing impact for research groups and interdisciplinary intersections. Utilizing data mining and emerging technologies with many methods of reviewing the changing scholarly landscape new products and metrics are introduced.

Bibliographic management software is yet another example of managing references and organizing retrieval of multiple sources in a highly personal and customized way that can accommodate a range of information sources. Many are free software applications that can be downloaded, some have web-based functionalities and others are offered as fee-based subscription models.

Brand new applications of how to manage pdfs of journal articles or conference papers or book chapters allows one to build on products such as Mendeley or Zotero with the latest rollout of ReadCube by the Nature Publishing Group⁴⁶, which builds on providing access to fulltext articles. Priem states, “Bibliometrics mined impact on the first scholarly web, altmetrics mines impact on the next one.”⁴⁷

Examples of different impacts are:

- Impact factor
- H-index
- Times cited (different variations but counts times cited in primarily journal articles)
- i10 Index (articles with 10+ citations)
- Highly cited (usually relates to authors)
- Eigenfactor

- Source Normalized Impact per Paper (SNIP)
- Google Scholar Citations
- Microsoft Academic Search
- Publish or Perish (PoP)
- Altmetric for Scopus (tracks mentions of papers across social media sites, blogs and reference managers)
- Academia.edu

Innovation is right, front and center in the research lifecycle. In recent years, there have been many new examples of products that are offering new ways to analyze data. Most libraries have a subject guide that demonstrates and describes the processes and products. My LibGuide⁴⁸ is but one example.

UCI LIBRARIES
UNIVERSITY OF CALIFORNIA - IRVINE

Libraries > Subject and Course Guides > Research Impact Using Citation Metrics
* UC Irvine access only

Research Impact Using Citation Metrics ✕ (no tags specified) ✕

Last Update: Nov 19, 2012 | URL: <http://libguides.library.uci.edu/research-impact-metrics> | Status: Private

Author Impact | Article Impact | Journal Impact Factor | Further Information | More Tutorials

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Recommended Methods

Some recommended methods for citation analyses are detailed in the pages of this guide.

- Google Scholar Citations
- Author Profile (Author Impact)
- H-index (Author Impact)
- Journal Citation Reports
- Impact Factor (IF) (Journal Impact)
- Eigenfactor (Journal Impact)
- Web of Science Cited Reference Search & Reports (Article Impact)
- Google Scholar Article Citation Search & Alerts (Article Impact)
- Altmetrics (Article Impact)

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Limitations

Limitations of citation metrics:

Research Impact is a measure of the significance and importance of academic work within a scholarly community.

Bibliometrics are the use of quantitative tools to study publications and other written material.

Citation metrics focus on the statistical patterns and measurements of citations.

Citation analysis can be used as a quantifiable measure of academic output and research impact, which can help inform decisions on publication, promotion, and tenure.

Altmetrics is increasingly becoming an alternative method of measuring the impact of scholarly output.

This guide is designed to help faculty members, graduate students and librarians use and understand the citation analysis tools available to us. At UCI, there is access to some of the major resources used for citation metrics. For example to obtain an Impact Factor (IF) you could consult the following tools - Web of Science, Journal Citation Reports and Google Scholar. Descriptions of and guides to these tools can be accessed using the above drop-down menu, organized according to need.

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Acknowledgements

This Guide was prepared by
Laine Thielstein

Conclusion

When we consider what makes people, companies, organizations or products innovative, we often conclude that they are different in some special, unique way. Innovation is often a catalyst for the mindset needed to achieve success and the result of a journey in which discovery plays a large part. Influenced by the recent book, *The Innovator's DNA*, we share how those authors provide five steps that they suggest leads to innovation where a bigger and better impact can be achieved:

1. Review and establish priorities
2. Assess discovery skills systematically
3. Identify a compelling innovation challenge that matters
4. Practice discovery skills (association, questioning, observing, networking, experimenting, skills)
5. Be coached to support development efforts⁴⁹

Within the research community, innovation will be tested as new products are being released to manage the range of information and new knowledge generated by sponsored research.

Data is probably the most critical of the new forms of grey literature that libraries and librarians need to address. Issues related to eScience and grey literature were more fully addressed in a paper delivered three

years ago at this conference.⁵⁰ Occasionally libraries have described the new research landscape as “data deluge” as they grapple with how to manage such resources so that they can be consulted, archived and reused. This is the new landscape of eResearch and eScholarship that has extended the boundaries and intersections of library collections and services. If libraries fail to embrace treating data, the risk of losing credibility and remaining relevant to the academic research and institutional landscape is huge. Activity at research libraries around the world now demonstrate how new structures are evolving to support institutional metrics that build on data management service models that include repositories, data curation and data management plans and extend to a range of other scholarly communication related services. The European Association of Research Libraries has documented ten recommendations for libraries to get started with data management plans⁵¹ and in the US over the last year the Association of Research Libraries and the Digital Library Federation hosted a series of institutes for their members to respond to the eScience and data agendas on their campuses.⁵² A recent conference in China highlighted such activity by Pacific Rim universities.⁵³

Data and research impacts including the new bibliometrics are clearly examples of the next generation of grey literature that will pave the changing times of higher education. They are an important indicator of how scholarship is viewed from the outside looking in at a given point of time. These are times of great change and fluidity where coping with ambiguity is the new norm. Michael M. Crow, President of Arizona State University and known as perhaps the most visible innovator currently leading a major research institution in the US, in the thriving metropolitan area of Phoenix, where he has created, an “unusual academic structure with ‘fused intellectual disciplines’ meant to reflect the way knowledge is developed and applied today and a culture deliberately focused on admitting and graduating a student body that is ethnically and economically representative of the community.”⁵⁴ Thus, innovation, grey literature and new paradigms in higher education fuel the research lifecycle.

¹ Levitt, Theodore (1965). Exploit the product life cycle. *Harvard Business Review* 43 (6): 82-84, November-December.

² Colloquium on Rethinking the Future of Scientific Communication (2012). Stanford University Libraries, March 8-9, 2. https://lib.stanford.edu/files/Colloquium.Summary.Final_.pdf Retrieved November 1, 2012.

³ Scholarship 2.0: An idea whose time has come (2012). <http://scholarship20.blogspot.com/2012/04/1st-international-workshop-on-mining.html> Retrieved May 20, 2012.

⁴ *Life Cycle Management: How business uses it to decrease footprint, create opportunities and make value chains more sustainable* (2009). UNEP/SETAC: vii. (<http://www.unep.fr/scp/publications/details.asp?id=DTI/1208/PA> - Retrieved October 20, 2012.

⁵ *Ibid.*, 4.

⁶ Hunkeler, David, and Ribetzer, Gerald, (2005). The future of Life Cycle Assessment. *International Journal of Life Cycle Assessment* 10, (5): 307.

⁷ *Life Cycle Management*: 5.

⁸ Anthony, Scott D., (2012). *The little black book of innovation: How it works, how to do it*. Cambridge, MA: Harvard Business Review Press: 16.

⁹ *Ibid.*, 30, 27, 22, 24.

¹⁰ Goldsmith, David. (2012). *Paid to think: A leader's toolkit for redefining your future*. Dallas, TX: Ben Bella Books, 432-433.

¹¹ *Ibid.*

¹² Wagner, Tony (2012). *Creating innovators: The making of young people who will change the world*. New York: Scribners. (see <http://dailyledventures.com/index.php/2012/05/30/tony-wagner-usa/>)

¹³ Dunaway, Michelle, (2012). *The Future of University Libraries: 2012 Midwinter Report*, 2.

¹⁴ Neal, James (2011). Advancing from kumbaya to radical collaboration: Redefining the future research library. *Journal of Library Administration*, 51 (2): 67.

¹⁵ Jantz, Ronald C. (2012). A framework for studying organization innovation in research libraries. *College & Research Libraries*, 73 (6): 528-529.

¹⁶ Greenstein, Daniel (2009). Libraries of the future. *Inside Higher Ed*, available online at <http://www.insidehighered.com/news/2009/09/24/libraries>. Retrieved November 13, 2012.

¹⁷ Borgman, CL (2010). Research Data: Who will share what, with whom and why? Fifth China – North America Library Conference, September 8-10, 2010: 13. <http://dx.doi.org/10.2139/ssrn.1714427>. Retrieved November 1, 2012.

¹⁸ O'Banion, T. & Weidner, L. (2010). *The nature of innovation in the community college*. Phoenix, AZ: League for Innovation in the Community College. Retrieved November 11, 2012, from http://www.league.org/league/projects/nature_of_innovation/

¹⁹ *Ibid*

²⁰ Innovation with impact, creating a culture for scholarly and systematic innovation in engineering education. Washington D.C. American Society for Engineering Education (ASEE). Retrieved October 1, 2012 from <http://www.asee.org/about-us/the-organization/advisory-committees/Innovation-with-Impact>

²¹ (2012). Innovation with impact, creating a culture for scholarly and systematic innovation in engineering education. Washington D.C. American Society for Engineering Education. <http://www.asee.org/about-us/the-organization/advisory-committees/Innovation-with-Impact> (accessed November 1, 2012)

²² O'Banion, T. & Weidner, L. (2010). *The nature of innovation in the community college*. Phoenix, AZ: League for Innovation in the Community College. Retrieved November 11, 2012, from http://www.league.org/league/projects/nature_of_innovation/

²³ Radford, A. (2011). U.S. Department of Education, National Center for Education Statistics. Learning at a distance undergraduate enrollment in distance education courses and degree programs. *Stats in Brief*, (NCES 2012-154). Retrieved from website: <http://nces.ed.gov/pubs2012/2012154.pdf>

²⁴ *Ibid*

²⁵ *Ibid*

²⁶ *Ibid*

²⁷ Norris, D., & Lefrere, P. (2011). Transformation through expeditionary change using online learning and competence-building technologies. *Research in Learning Technology*, 19(1), 61-72. doi: 10.1080/09687769.2010.549205

²⁸ *Ibid*

²⁹ Gelfand, Julia (2007). Updating Grey Literature as distance education matures. Paper presented at the Ninth International Conference on Grey Literature, Antwerp, Belgium, December 11, 2007.

³⁰ See <https://www.edx.org/>, www.udacity.com/, and <https://www.coursera.org/>

³¹ Levine, Arthur and Deane, Diane R. (2012). *Generation on a tightrope: A portrait of today's college student*. San Francisco, CA: Jossey-Bass, 3rd ed.

³² Beloit Mindset List 2016, <http://www.beloit.edu/mindset/2016/> (accessed November 1, 2012)

³³ Millennials: A portrait of generation next, 2009. Pew Research Center. <http://pewsocialtrends.org/files/2010/10/millennials-confident-connected-open-to-change.pdf> (accessed November 17, 2012)

³⁴ Bradley, Anthony J., and McDonald, Mark P., (2011). *The social organization: How to use social media to tap the collective genius of your customers and employees*. Boston, MA: Gartner & Harvard Business Review Press: 29.

³⁵ *Ibid*, 23.

³⁶ *Ibid*, 31-32.

³⁷ *Ibid*, 148.

³⁸ Goldsmith, David. (2012). *Paid to Think: A leader's toolkit for redefining your future*. Dallas, TX: Ben Bella Books, 445.

³⁹ First international workshop on mining scientific publications (2012). <http://core-project.kmi.open.ac.uk/jdc12012> (accessed October 1, 2012)

⁴⁰ http://sspnet.org/Publications_and_Links/Standards/spage.aspx (retrieved November 15, 2012)

⁴¹ <http://www.ala.org/acrl/standards> (retrieved November 15, 2012)

⁴² Pritchard, Alan (1969). Statistical bibliography or bibliometrics? *Journal of Documentation*, 25(4).

http://www.academia.edu/598618/Statistical_bibliography_or_bibliometrics (retrieved November 1, 2012)

⁴³ <http://altmetrics.org> (accessed November 17, 2012)

⁴⁴ ResearchRemix <http://researchremix.wordpress.com/> (accessed November 17, 2012)

⁴⁵ Priem, Jason (2012). Toward a second revolution: altmetrics, total-impact, and the decoupled journal. Invited talk to Purdue University Libraries. Lafayette, IN, February 14, 2012.

https://docs.google.com/presentation/view?id=ddfg787c_362f465q2g5 (retrieved November 15, 2012)

⁴⁶ <http://www.readcube.com/> (accessed November 17, 2012)

⁴⁷ Priem.

⁴⁸ LibGuide, Research Impact Using Citation Metrics - <http://libguides.lib.uci.edu/researchimpact-metrics> (accessed November 17, 2012)

⁴⁹ Dyer, Jeff, Gregersen, Hal, and Christensen, Clayton M., (2011). *The Innovator's DNA*. Cambridge, MA: Harvard Business Review Press, 259

⁵⁰ Gelfand, Julia, New shades of grey: The emergence of e-science, scientific data and challenges for research libraries. Paper presented at the 11th International Conference on Grey Literature, Washington, DC, December 14, 2009.

⁵¹ LIBER's Ten Recommendations (2012). <http://www.libereurope.eu/news/ten-recommendations-for-libraries-to-get-started-with-research-data-management> (accessed October 10, 2011)

⁵² ARL DLF E-Science Institutes 2011-2012. <http://www.arl.org/rli/eresearch/escien/escieninstitute/index.shtml> (accessed October 11, 2012)

⁵³ Todd, H. (2012). A partnership to support the research lifecycle: A case study from the University of Queensland Library. Presentation made at the Pacific Rim Digital Library Alliance (PRDLA) Conference, Beijing, China. November 4, 2012.

⁵⁴ Blumenstyk, Goldie (2012). Change takes root in the desert: Embracing inclusiveness, Arizona State University pursues transformation on a grand scale. *Chronicle of Higher Education*, November 19, 2012.

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Research Life Cycle: Exploring Credibility of Metrics and Value in a New Era of eScholarship that Supports Grey Literature

**GL14 Rome, Italy
November 30, 2012**

<p>Julie Gelfand Applied Sciences & Engineering Librarian University of California, Irvine (UCI) Libraries PO Box 19557 Irvine, CA, USA 92613-9557 949-824-4971 jgelfand@uci.edu URL: www.uci.edu</p>	<p>Anthony (Tony) J. Lin Head of Public Services Irvine Valley College Library 3380 Irvine Center Drive Irvine, CA, USA 92618 949-451-4371 ajlin@ivc.edu URL: www.ivc.edu</p>
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Fundamentals of the Research Life Cycle

- Every product has a defined life cycle and a limited life
- Sales and marketing require different passages, and both challenges and opportunities are presented to the distributor or seller
- Each life cycle stage demands attention to marketing, financing, manufacturing, purchasing and other strategies to support it successfully

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Main Stages of Product Life Cycle

- Market Development – full of unknowns, uncertainties; trying not to prematurely fold
- Growth – responds to consumer demand/interest, develop brand loyalty over other products, establish pricing
- Maturity – responds to competitive intelligence; requires creative marketing, communication with users or customers
- Decline (saturation) – over capacity is usually the result of this stage but it can be a positive outcome with prices and margins reduced diverting the decline with a more creative force.

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Lifecycle Management

<http://www.galleinfo.com/content/pages/lifecycle-management>

LIFE CYCLE ASSESSMENT

Assessing Impact

<http://www.pg.com>

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Innovation

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Three Types of Innovation

1. Continuous innovation – suggests incremental changes or improvements and is "a common way to satisfy existing customers while grabbing new users."
2. Dynamically continuous innovation – represents a change in the way we use a product without changing the technology behind the product all that much
3. Discontinuous innovation – requires a significant behavioral change but is not synonymous with disruptive innovation because that causes immediate changes while discontinuous innovation may take significantly longer to influence change.

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Creating Innovations by Tony Wagner (2012)

For video trailer:

<https://vimeo.com/35403245>



Wagner on Why I Wrote This Book

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Libraries and Innovation

- Demonstrating value
- Rethinking library services
- Reconfiguring library spaces
- Preparing psychologically for the future.

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Research libraries in the future...

"...are more entrepreneurial organizations, more concerned with innovation, business planning, competition and risk, leveraging assets through new partnerships to create new financial resources."

James Neal, 2011

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10

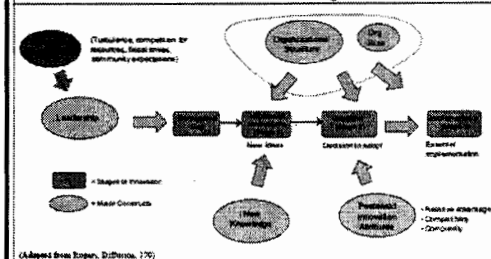
Innovation Process Model

- Leadership
- New knowledge
- Organizational structure
- Perceived innovation attributes.

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FIGURE 1
The Innovation Process Model and Stages of Diffusion



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12

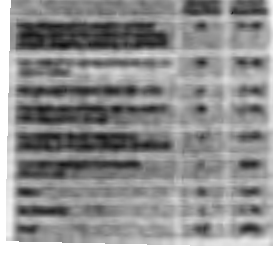
University Library of the future...

"The university library of the future will be sparsely staffed, highly decentralized and have a physical plant consisting of little more than special collections and study areas."

Daniel Greenstein, 2009

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Community College Innovation



Source: O'Banion, T. & Weidner, L. (2010)

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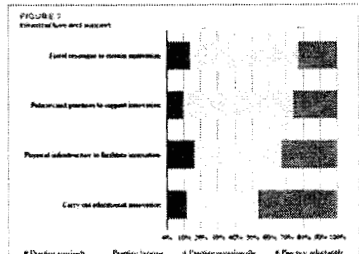
RECOMMENDATIONS FOR CREATING A CULTURE FOR SCHOLARLY AND SYSTEMATIC INNOVATION IN ENGINEERING EDUCATION: GOING FROM INNOVATION TO INNOVATION WITH IMPACT

1. Value and report career-long professional development progress in teaching, learning, and education innovation for engineering faculty and administrators, beginning with pre-career preparation for the future faculty.
2. Expand **collaboration and partnerships** between engineering programs and (a) other disciplinary programs germane to the education of engineers as well as (b) other parts of the educational system that support the pre-professional, professional, and continuing education of engineers.
3. Continue current efforts to make engineering programs more engaging and relevant, and especially expand efforts to make them more **interdisciplinary**.
4. Increase, leverage, and diversify **resources** in support of engineering teaching, learning, and educational innovation.
5. Reinforce the proven principles and effective practices of teaching, learning, and educational innovation, and raise awareness of the scholarship of engineering education.
6. Conduct periodic **self-assessments** within one individual institution to measure progress in implementing policies, practices, and infrastructure in support of scholarly and systematic innovation—innovation with impact—in engineering education.
7. Conduct periodic **engineering community-wide self-assessments** to measure progress in implementing policies, practices, and infrastructure in support of scholarly and systematic innovation—innovation with impact—in engineering education.

Source: Innovation with Impact (2012)

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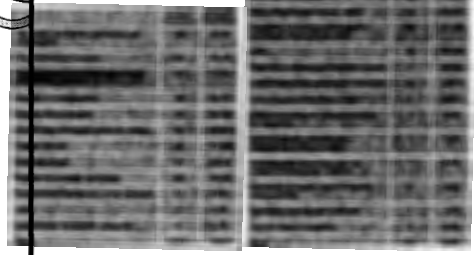
Support for Innovation in Academia



Source: Innovation with Impact (2012)

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Successes and Challenges - CC



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Challenges in a 4 Year University

TABLE 1
Top Five Challenges and Opportunities

Challenges			
Faculty	Count	Chair	Count
Resources	46	Resources	30
Rewards	37	Rewards	29
Wellhead	26	Wellhead	27
Awareness of Innovation	18	Task Research Emphasis	11
Assessment of Innovation	18	Changing the Curriculum	12
		Awareness of Innovation	12

Opportunities			
Faculty	Count	Chair	Count
Faculty Development	18	Faculty Commitment	24
Rewards	15	Faculty Development	18
Industry & Entrepreneurship	12	Awareness of Innovation	15
STEM Center	10	Innovative Pedagogy	17
Resources	7	Rewards	17
Changing the Curriculum	7		


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Recommendation to Foster Innovations in Community Colleges

- Demonstrate a need.
- Develop a vision and a plan.
- Put the plan into action.
- Talk with colleagues.
- Build a team.
- Secure administrative support.
- Dedicate the required time and effort.
- Evaluate the innovation's effectiveness.
- Tie the innovation to the college mission, values, and goals.
- Take risks.
- Plan for sustainability of the innovation.

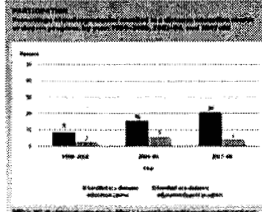
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How do I know innovation was successful? (Community College)



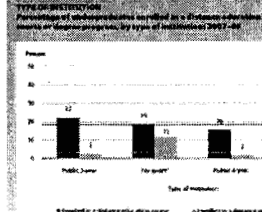
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Distance Education - Enrollment



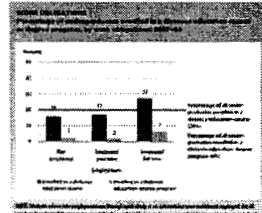
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Distance Education - Institution



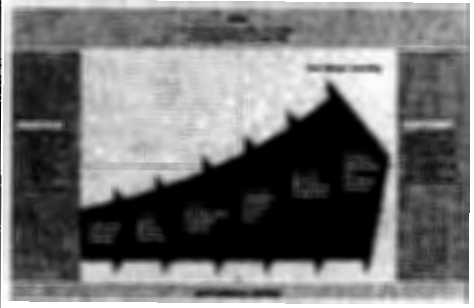
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Distance Ed - Employment

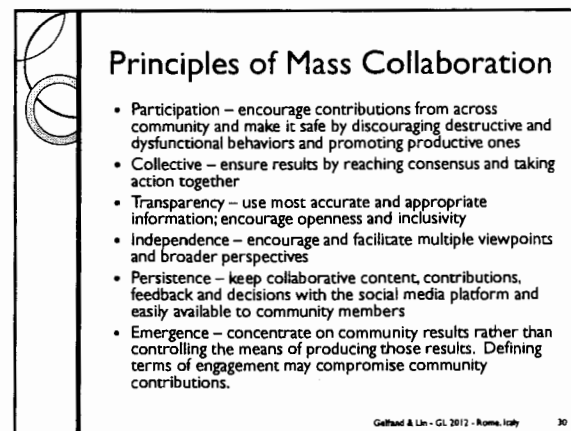
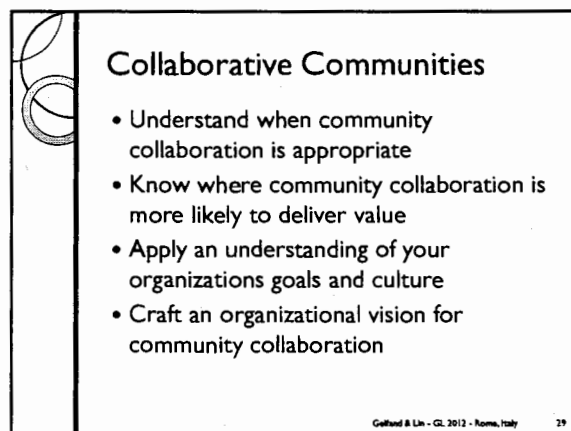
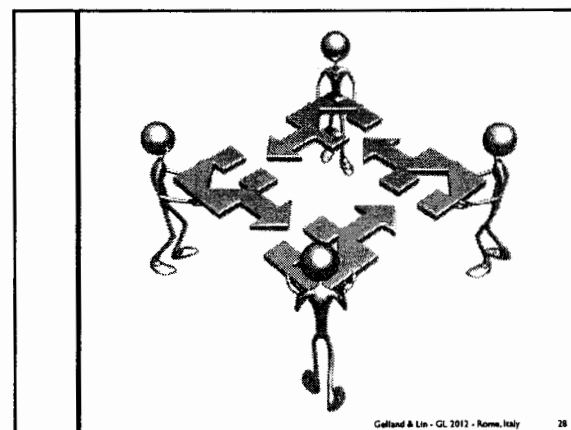
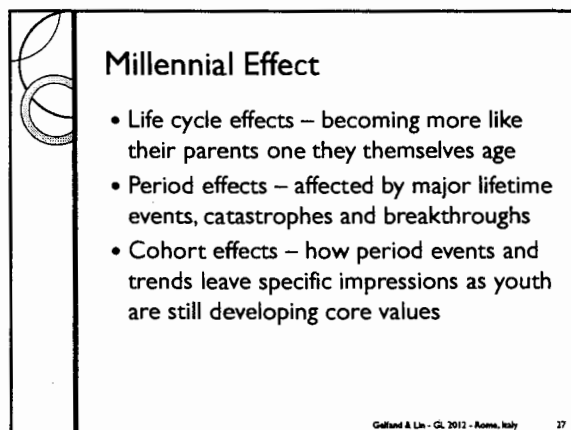
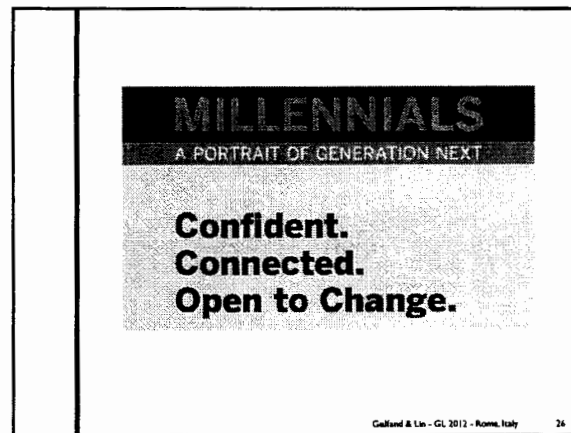
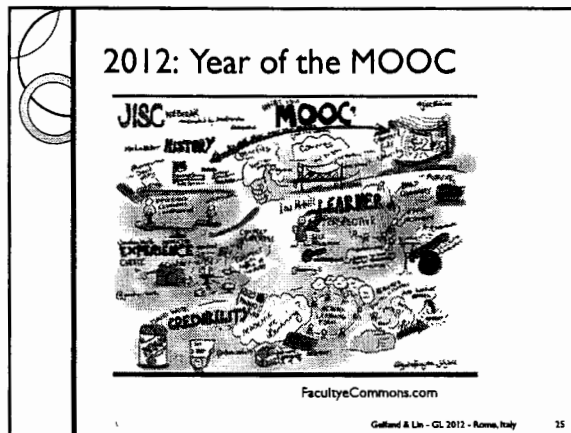


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Evolution of Distance Education



Source: Gelfand and Lin, 2014



Social media structures

- Crowdsourcing
 - Business based
- Storyboarding
 - Ethnographic / cultural / community centric
- Mind-mapping
 - Relationship focused
- Wordles
 - Spontaneous & random

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<http://www.pmccomplete.com/InformationLifeCycleManagement.asp>

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Created with www.wordle.com

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New & expanded packages of GL

- Data
- Patents
- Standards
- Benchmarking
- Social media
- ICT channels
- Digitized formats & new media forms
- Metrics, bibliometrics, altmetrics

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Impact

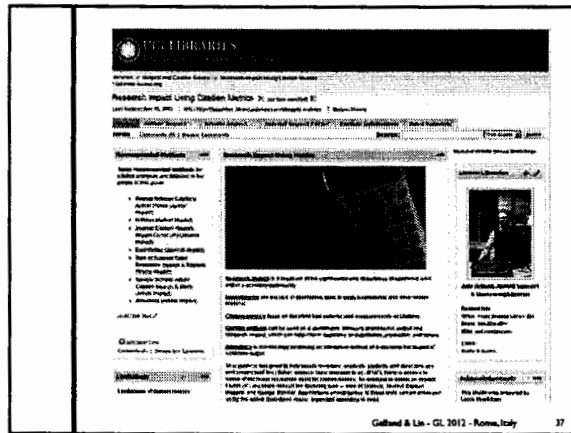
usage	peer-review	citations	alt-metrics
downloads views	expert opinion		storage links bookmarks conversations

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Examples of Impacts

- Impact factor
- H-index
- Times cited (different variations but counts times cited in primarily journal articles)
- i10 Index (articles with 10+ citations)
- Highly cited (usually relates to authors)
- Eigenfactor
- Source Normalized Impact per Paper (SNIP)
- Faculty Commons.com
- Google Scholar Citations
- Microsoft Academic Search
- Publish or Perish (PoP)
- Altmetric for Scopus (tracks mentions of papers across social media sites, blogs and reference managers)
- Academia.edu
- For research groups & communities
- Cross disciplinary measures

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Conclusions – all about innovation, research life cycle shifts & value

- Review and establish priorities
- Assess discovery skills systematically
- Identify a compelling innovation challenge that matters
- Practice discovery skills (association, questioning, observing, networking, experimenting, skills)
- Be coached to support development efforts

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Grazie!

Thank you for your attention.

Comments / Questions?

Ciao!

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