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Designing Instruction Activities to Guide Students Through the Research Lifecycle: A Science Librarian Approach

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Designing Instruction Activities to Guide Students through the Research Lifecycle

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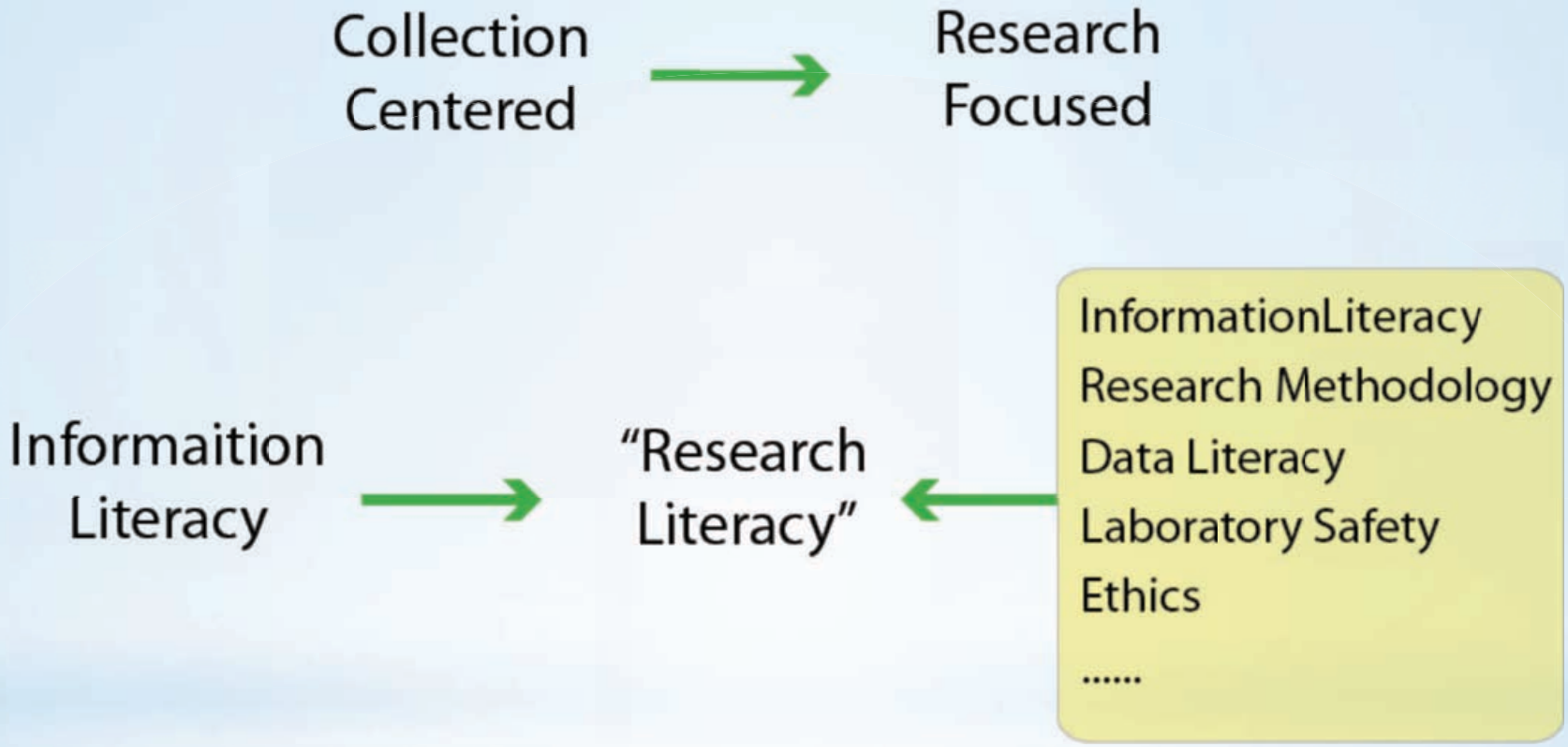

* Trends in Instructions Provided by Librarians in Research Institutions

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* Teaching and Learning Environment

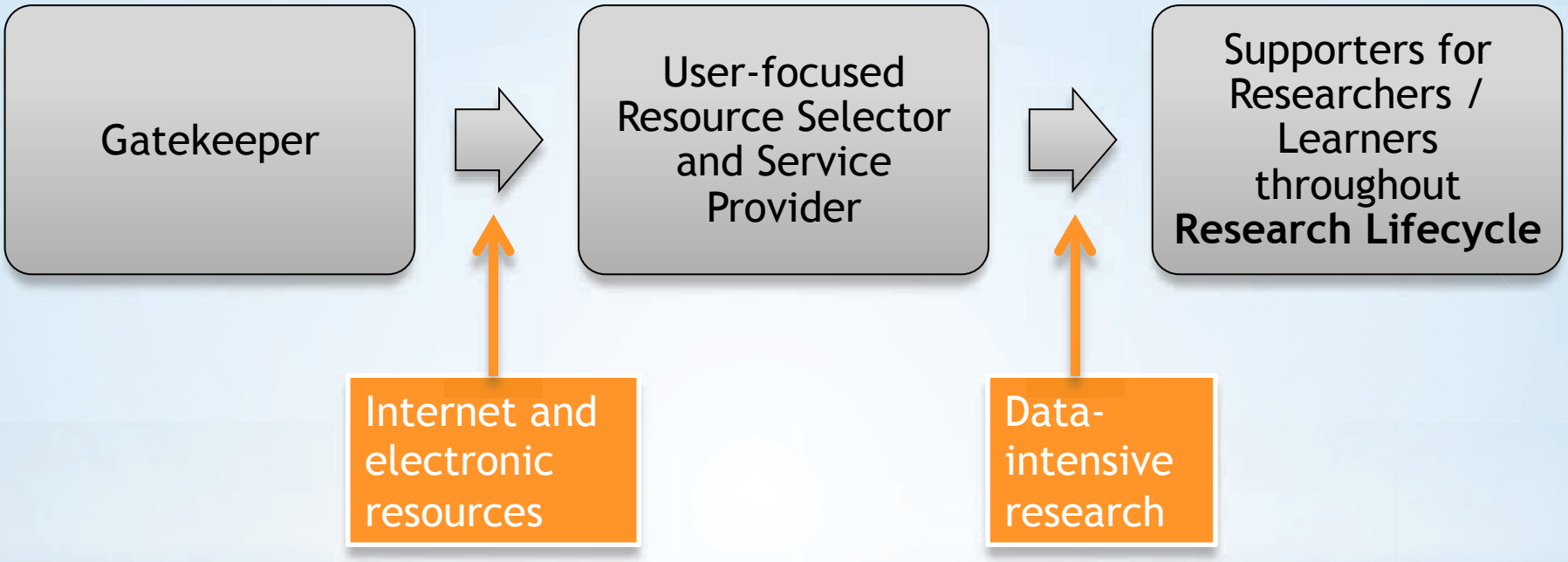
Curriculum-centric content delivery

* Research Environment

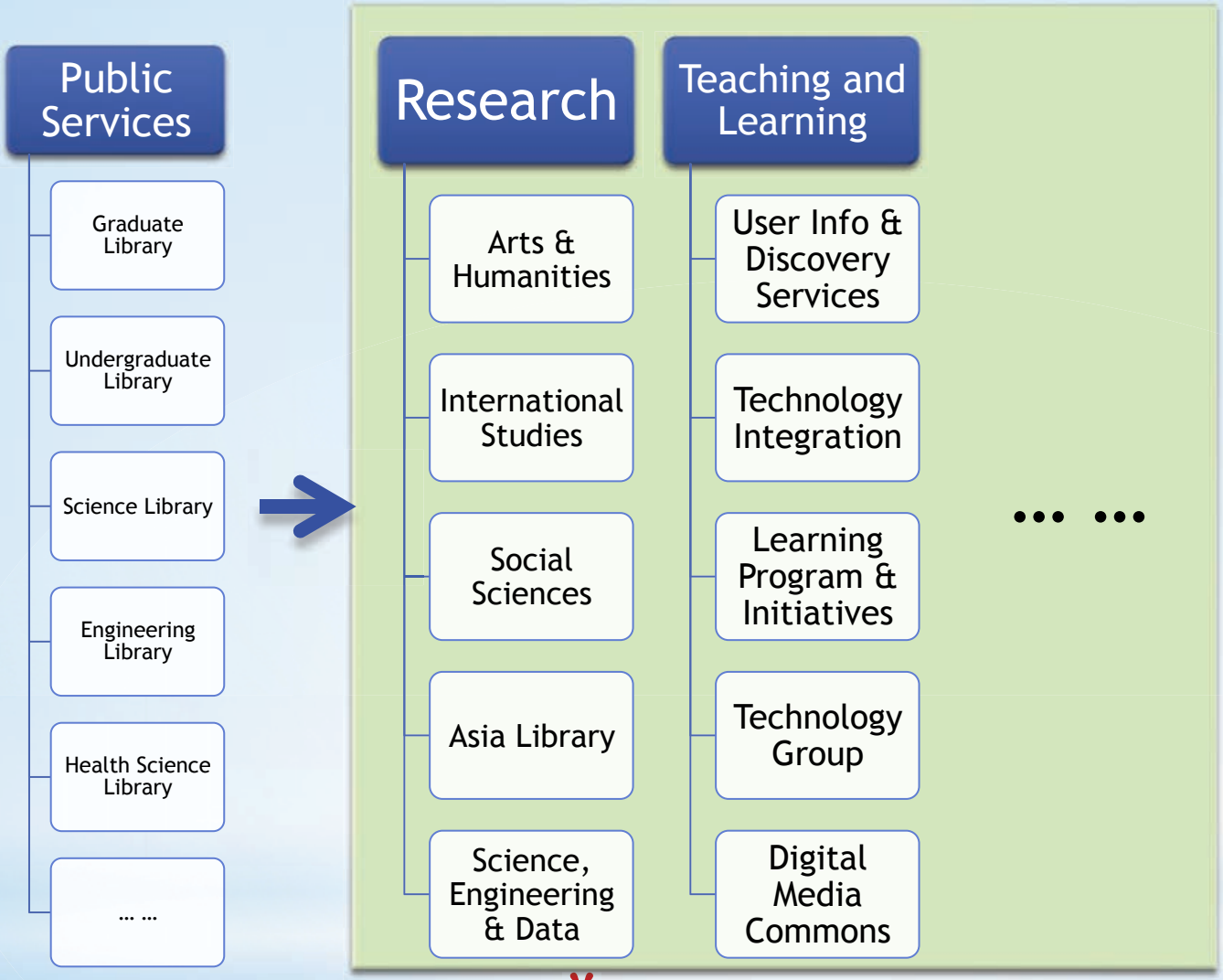
Working on a highly-focused topic in isolation

* Changing Environment in Higher Education

A. Brewerton, *New Review of Academic Librarianship* **2012,** *18* (1), 96-110. doi:10.1080/13614533.2012.665718

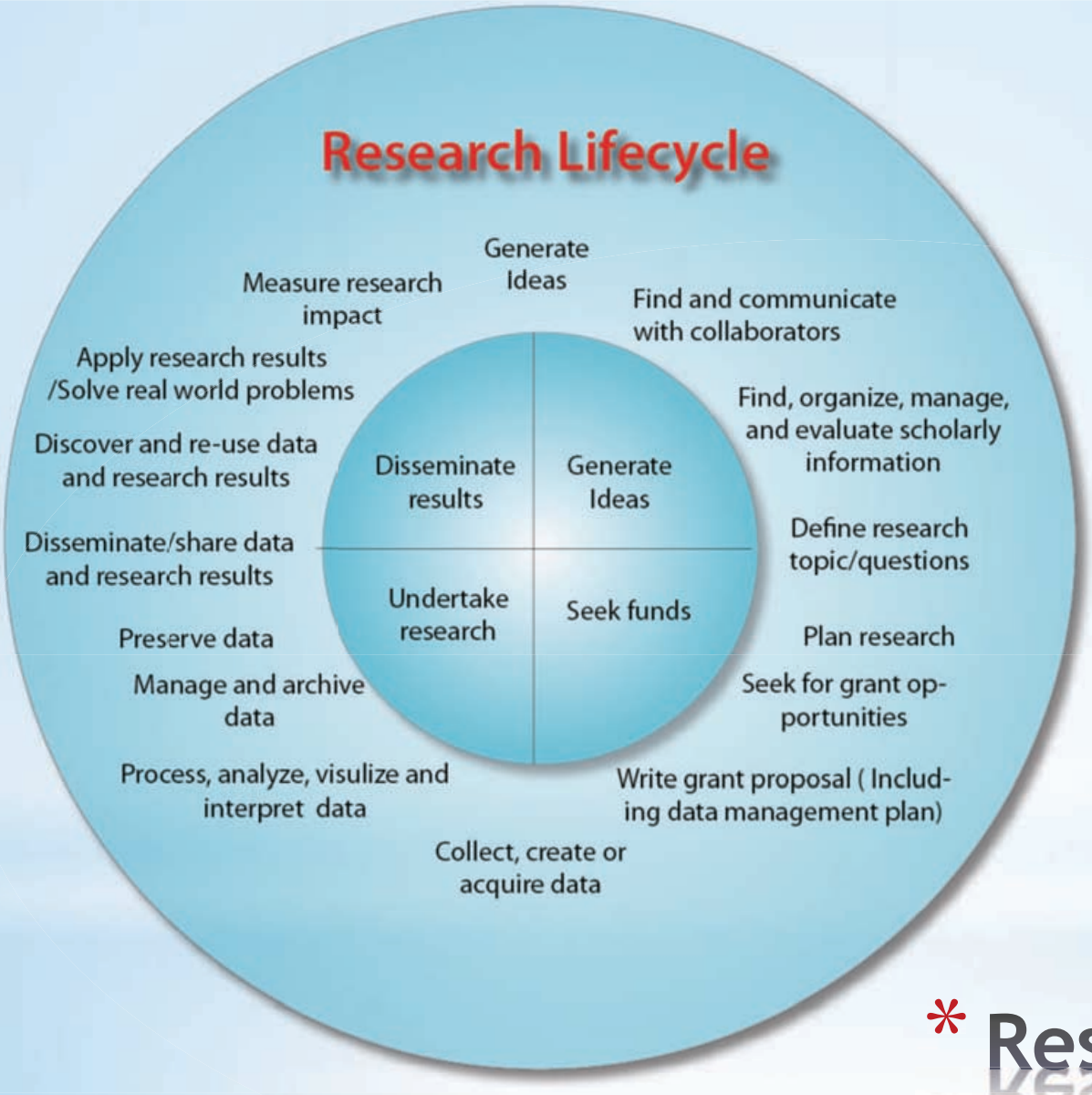


* Evolving Role of Subject Specialists



Subject specialists focuses more on supporting RESEARCH

* Local Change - University of Michigan Library Reorganization

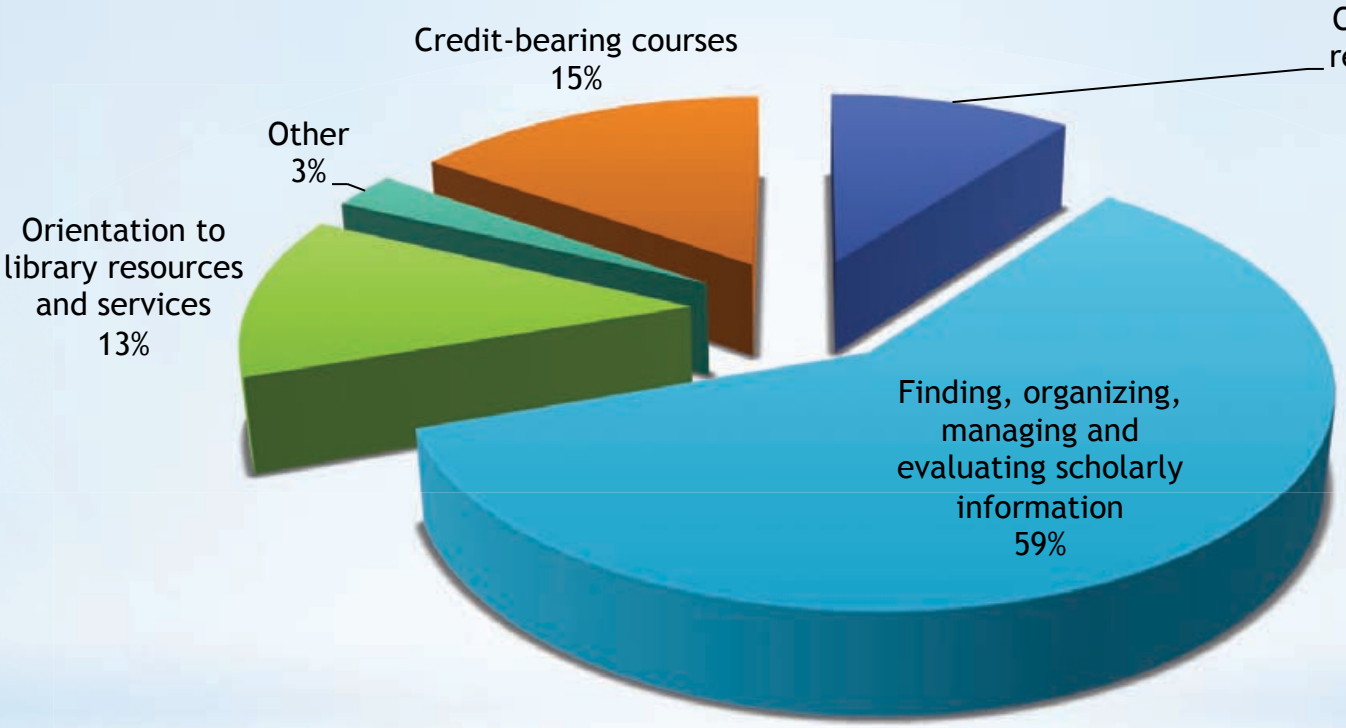


* All steps involve **obtaining, digesting, managing, synthesizing, and disseminating information**
* Librarians are good at connecting resources and people together

We can contribute to each step before and after lab !

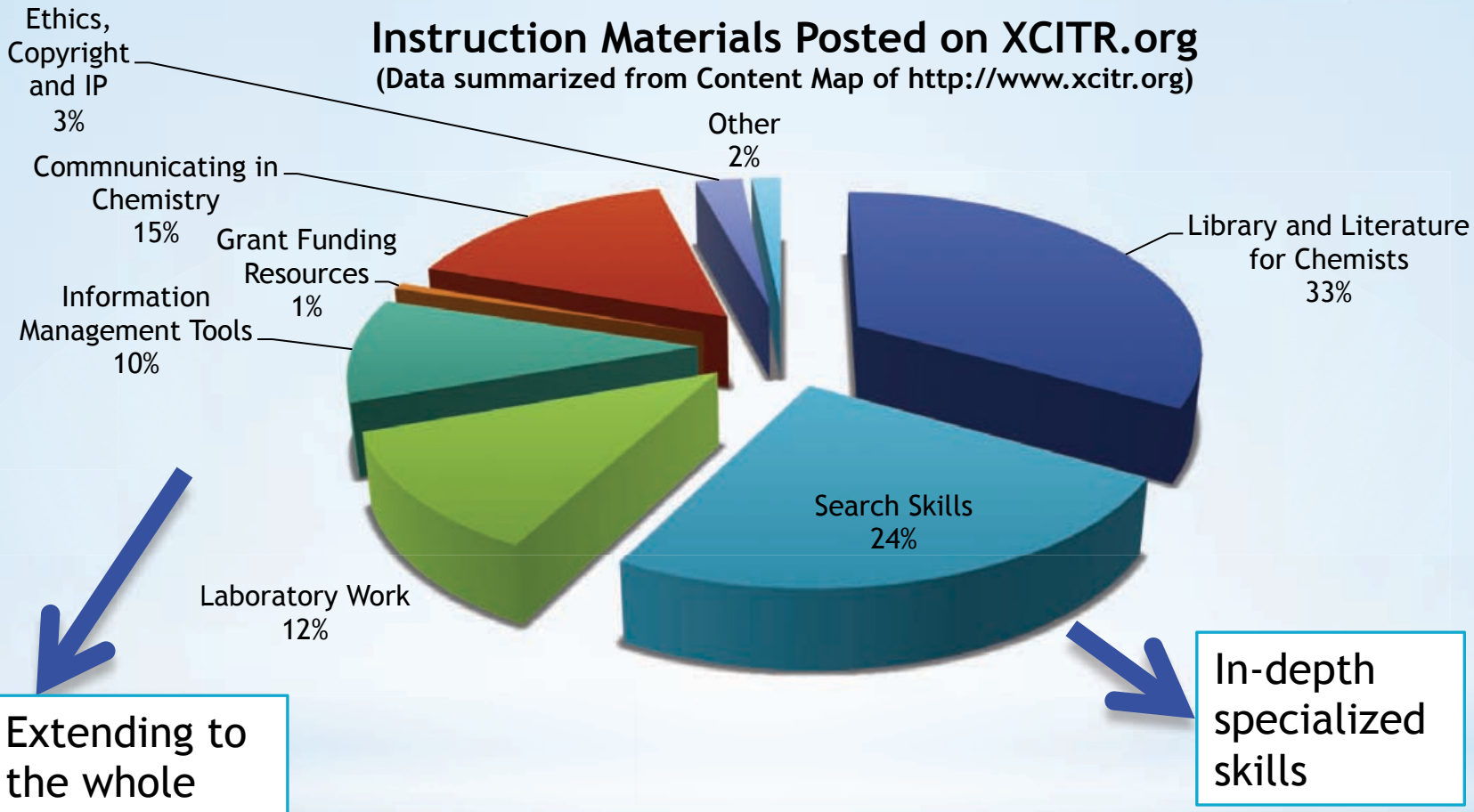
* Research Lifecycle

Instructions Delivered by Science and Engineering Librarians at University of Michigan Library in 2012 - 2013



Still appear to be collection-centered.

* Types of Instructions from Sci & Engin Librarians at the Univ. of Michigan



* What Chemistry Librarians May Be Doing?

Current Focus in Instruction

- Focusing on this step – "Find, manage, organize, and evaluate scholarly information"
  - In-depth/advanced searching skills
  - Critically evaluating information
- Extending to other steps of the research lifecycle

What Students Have to Say?

* Undergraduate Student

  "I participated in UROP (Undergraduate Research Opportunity Program) during my first year here. Although I was super busy in the lab, I didn't think I learned how to do research. I still have no idea how to approach a new research project."

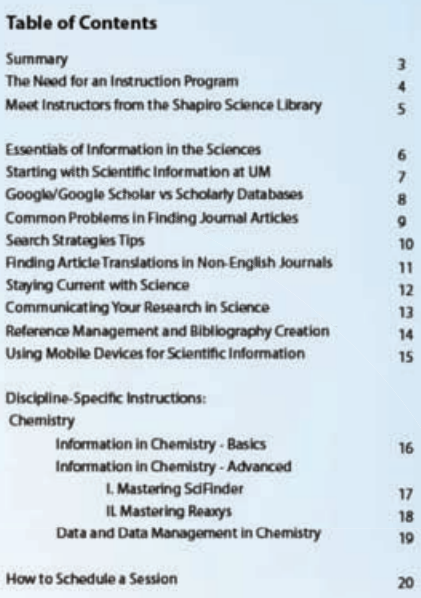
* Graduate Student

  "I know how to obtain 'good enough' articles quickly. Is there anything else I need to learn (from you)?"

  "I've read ten articles on this topic, but how am I supposed to come up with an original proposal from them? I can't discuss this with my advisor. "

Gaps between learning knowledge/skills and applying the knowledge/skills into research need to be filled.

- Most popular sessions requested by instructors
  - Scientific Writing and Presenting Your Research Results
  - Wikipedia Editing
- Basic search skills mostly requested as customized online tutorials and office hours
- Advanced search skills occasionally requested



Going in-depth with finding information is important but we also need to explore the breadth of our instruction scope.

How about Professors?

Mapping Current Instructions to RLC

* Mapping instruction activities to the RLC can guide librarians to identify
  * Gaps in supporting research
  * Opportunities to collaborate with other librarian colleagues and other units on campus for instruction development.

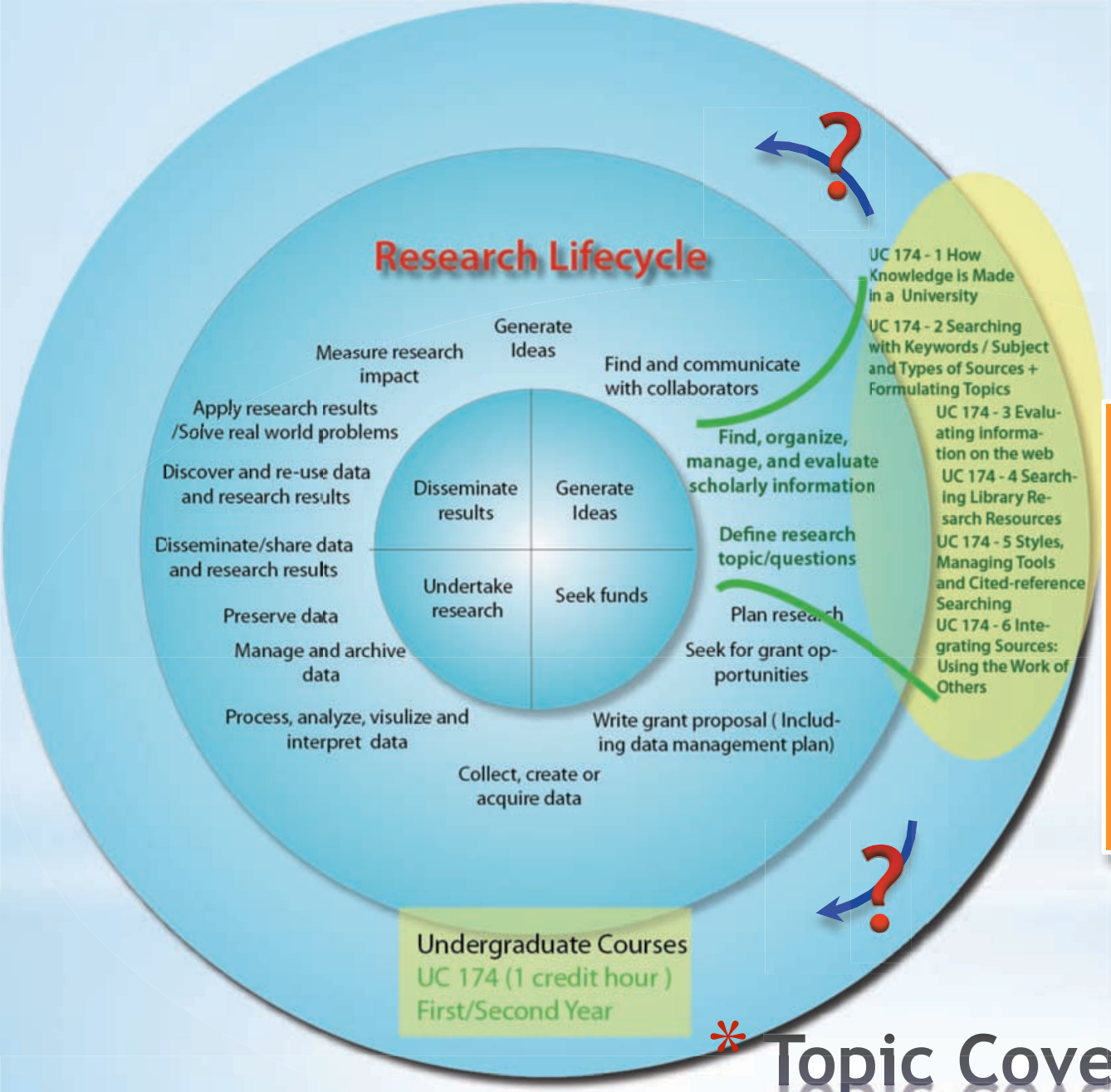
*For Undergraduates

A basic for-credit course is in place.

Needs to develop an advanced level course.

Course	UC 174: Digital Research: Critical Concepts and Strategies
Audience	First- and second-year undergraduates
Credit	1 Credit Hour
Length	2 hours / week, 7 weeks
Focus	Basics of “finding, organizing, managing and evaluating scholarly information”
Final project	An annotated bibliography on the topic selected by the student
Participation	~100 undergraduates / year ; ~30 in Sciences

* Overview of UC 174 - A basic level library research course



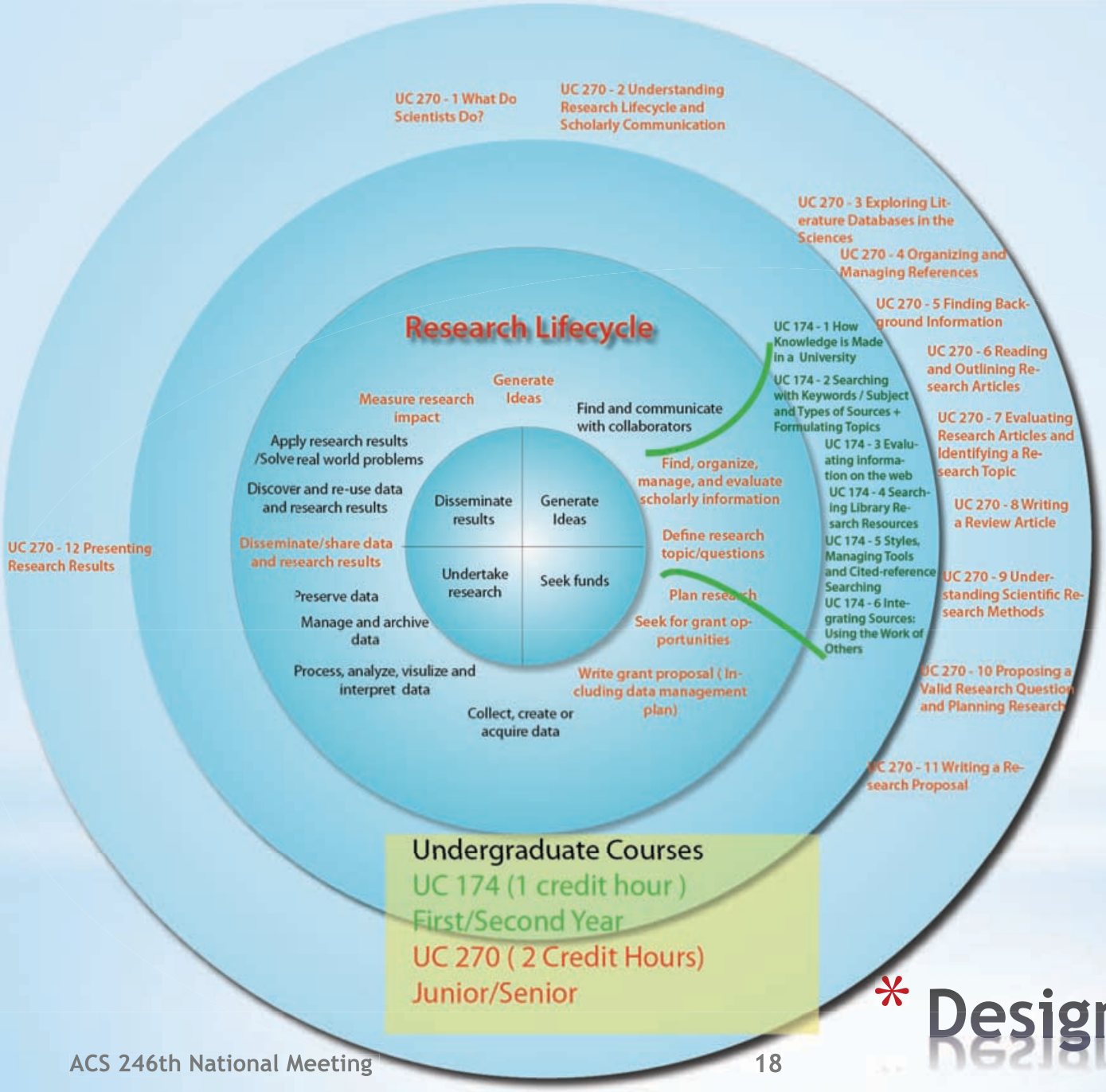
To design another advanced level course for students in the Sciences

- Go in-depth?
  or
- Extend to other steps of RLC?

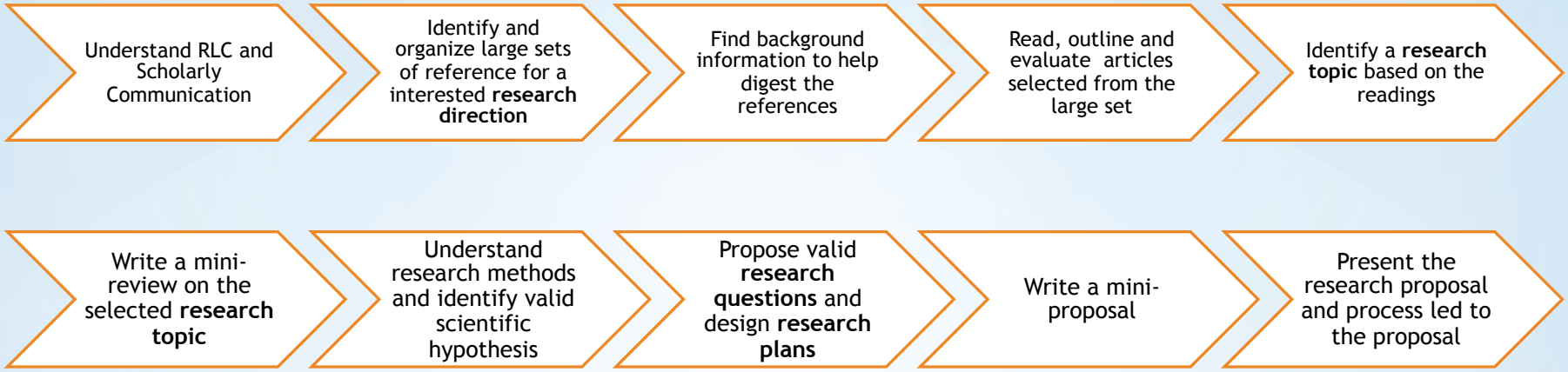
* Topic Covered in UC 174

Course	UC 174: Digital Research: Critical Concepts and Strategies	UC 270: Digital Research in the Sciences
Audience	First- and second-year undergraduates	Junior and senior undergraduates
Credit	1 Credit Hour	2 Credit Hours
Length	2 hours / week, 7 weeks	2 hours / week, 12 weeks
Focus	Basics of “finding, organizing, managing and evaluating scholarly information”	Expanding the “basics” and Extending to “write a research proposal / presenting research”
Final project	An annotated bibliography on the topic selected by the student	A mini literature review and a mini research proposal
Participation	~100 undergraduates / year ; ~30 in Sciences	A trial in 2013

* Overview of UC 270 - An advanced level research course

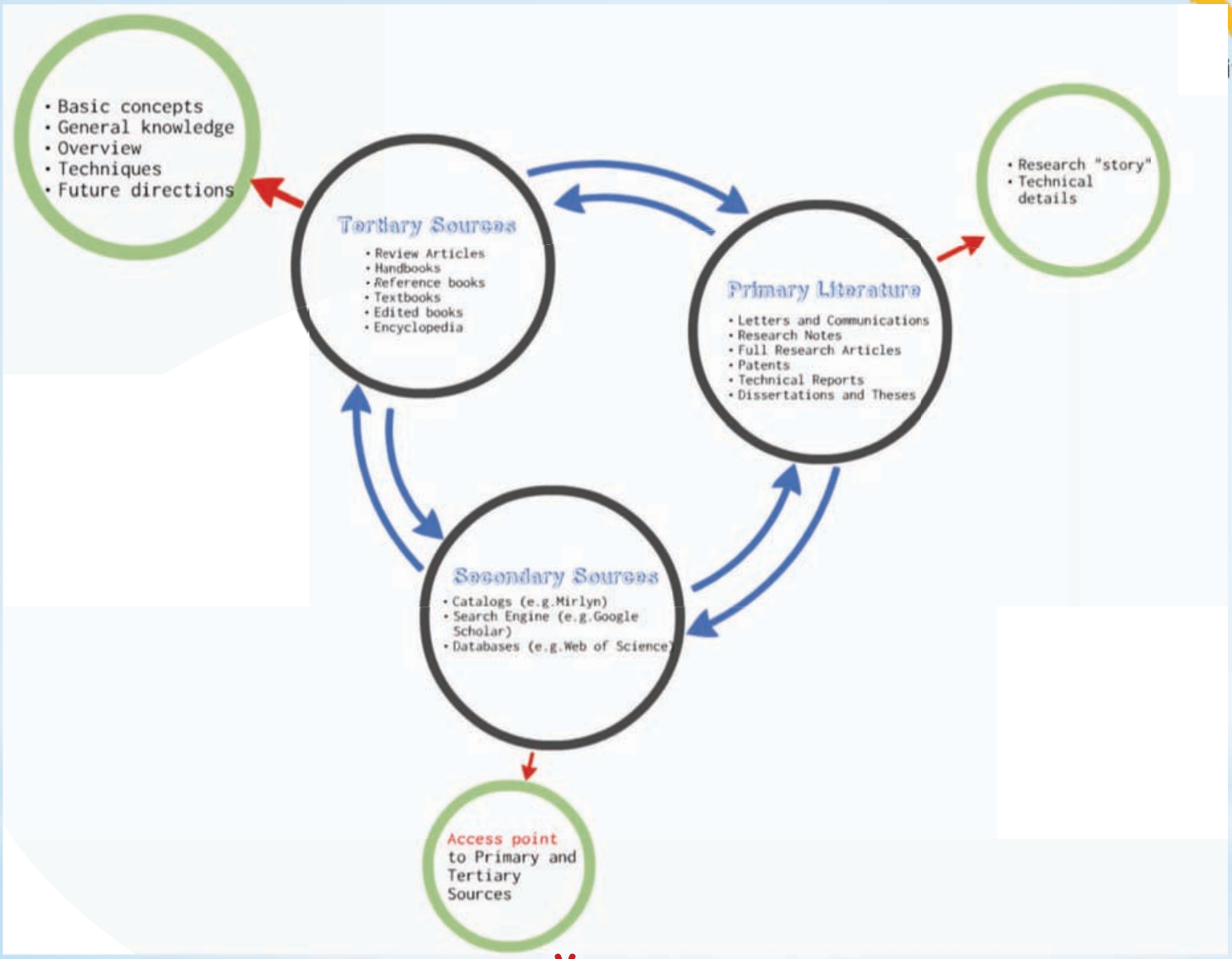


* Design of UC 270



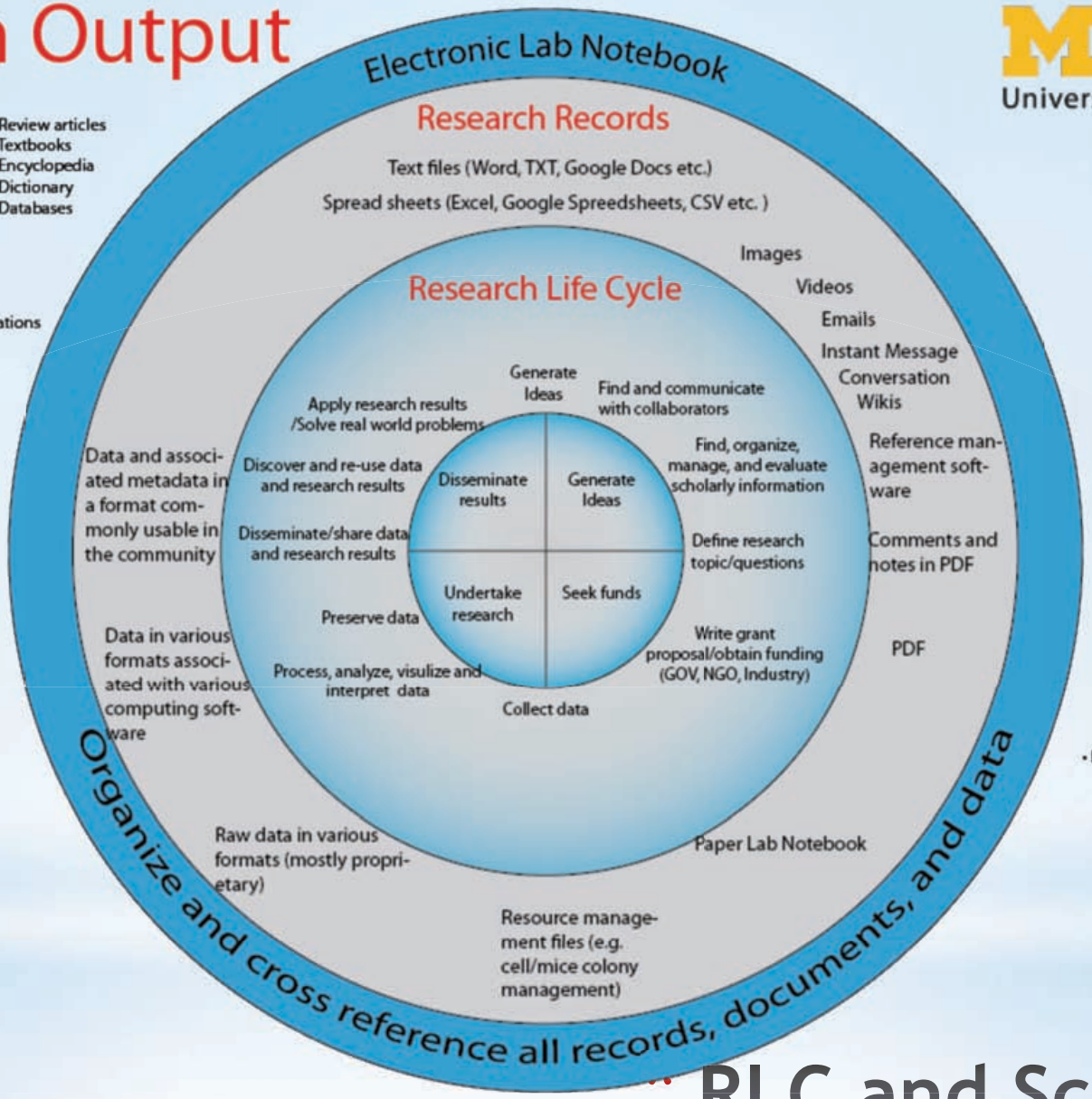
- 8 Assignments + 3 Reflections build up to a mini-review, mini-proposal, and an oral presentation
- Depth: practice advanced search skills with the goal to select a research topic
- Breadth: RLC steps beyond finding, organizing, and evaluating information
- Students run demonstrations of databases and software
- In-class discussions on issues in scholarly communication, such as open access and negative citations, etc.

* Flow of the Class



* Scholarly Publication Types

Research Output



- Popular magazines
- Business magazines
- Newspaper
- News websites
- Social network

- Review articles
- Textbooks
- Encyclopedia
- Dictionary
- Databases

- Letters and communications
- Research notes
- Fulll research articles
- Patents

- Data depositing to disciplinary or institutional repositories

- Technical report
- Dissertation and theses
- Research reports

- Emails
- Research blogs

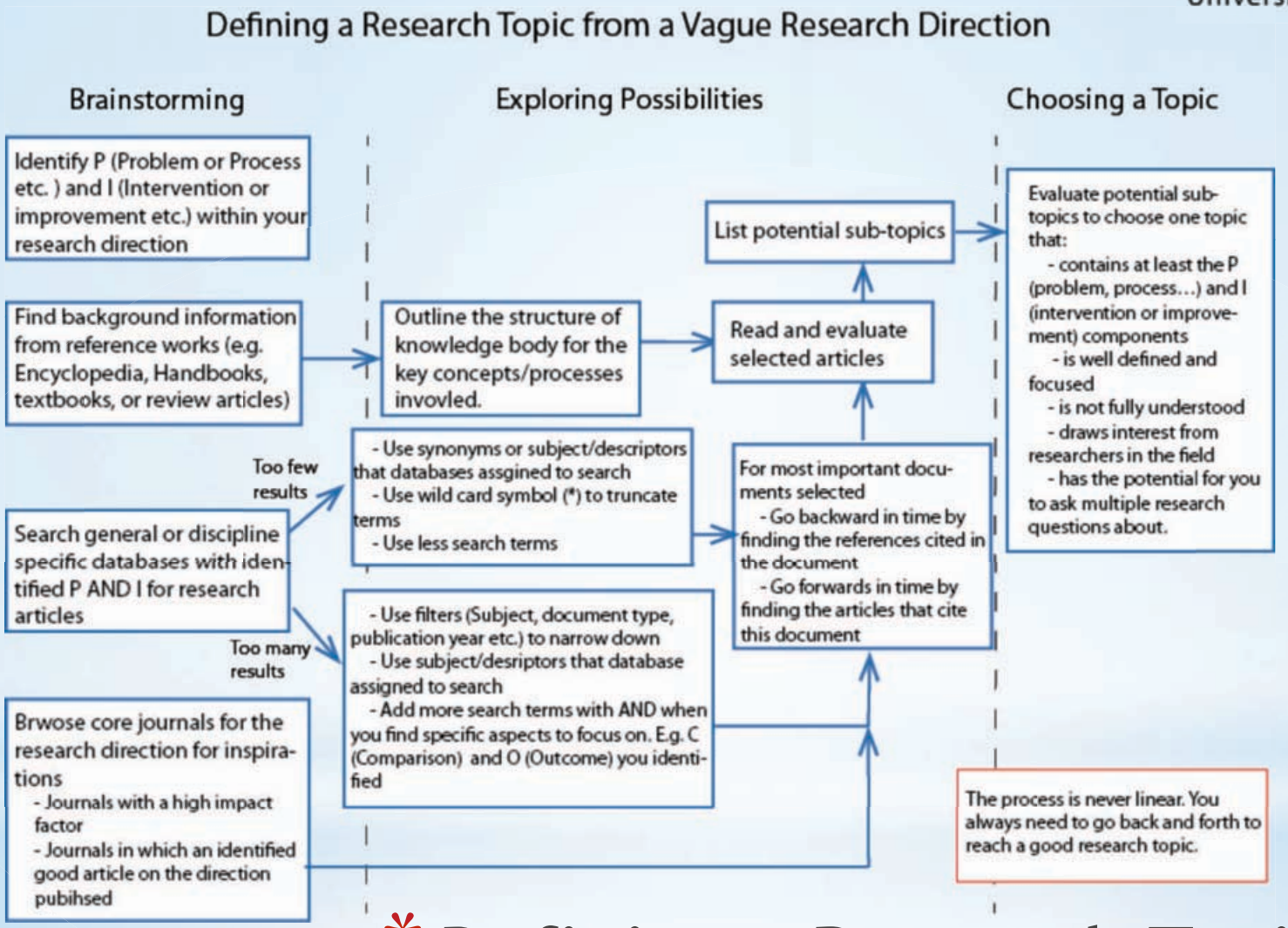
- Group webpages
- Reports
- Preprints
- Conference abstracts, papers, proceedings etc.

- Research proposals

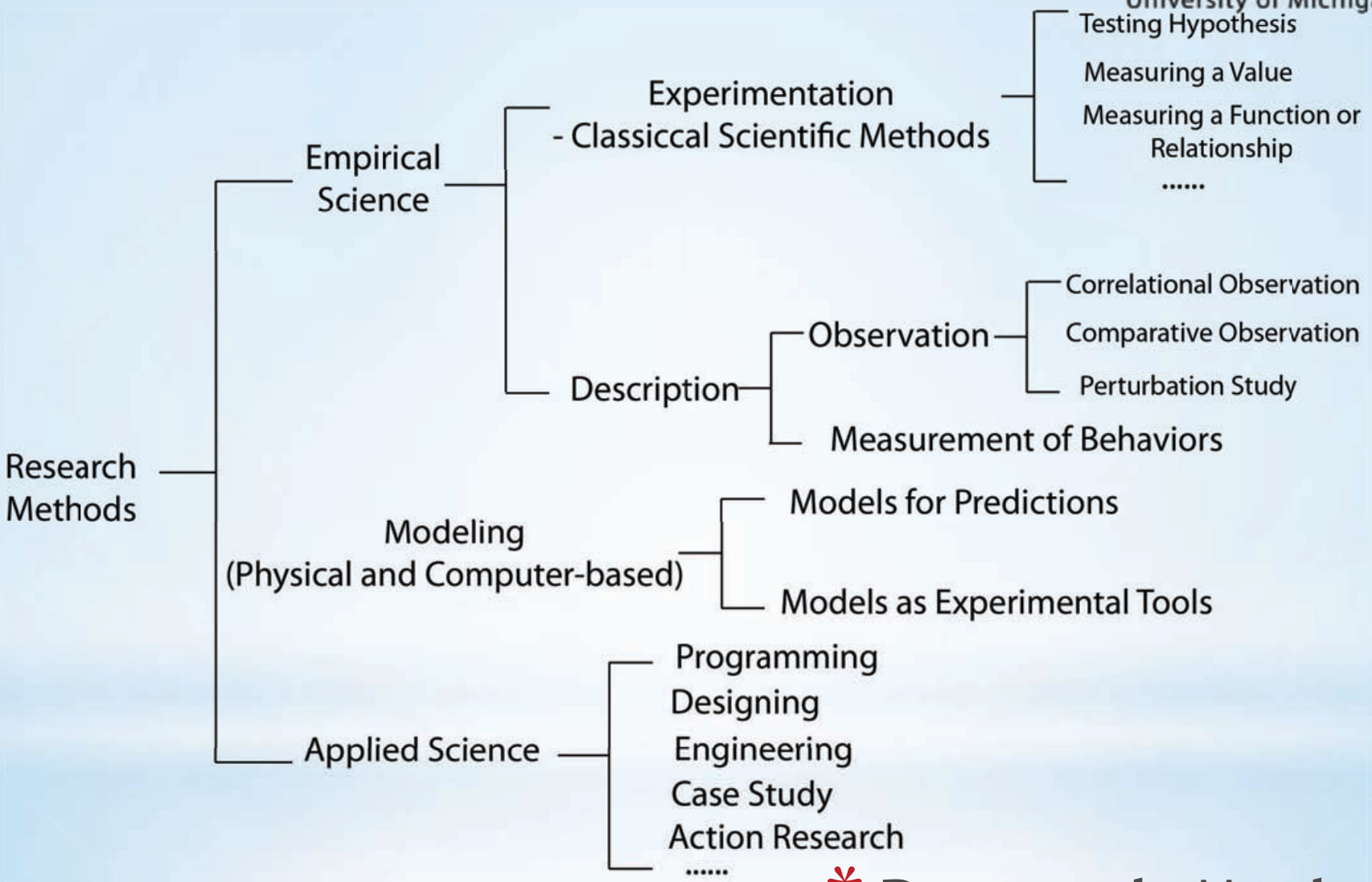
RLC and Scholarly communication

Major Section	Authors need to explain	Readers need to identify	Readers need to evaluate
Introduction	• What is in the paper? • Why is it an interesting and worthwhile issue? • Who contributed what previously?	• What is the subject? • What is known? • What remains to be known? • How or why a certain new question or questions arose? • What did the authors do to evaluate and answer the new questions?	• Background information sufficient? • Reasoning logic? • Research questions valid? relevant?
Methods	• How did they do the work? (for others to duplicate and confirm)	• Initial facts and assumptions • Object, materials, place, instruments, programs, etc. involved. • Protocols and methods to obtain/collect and analyze data.	• Methodology valid? Relevant? • Assumptions of the methods valid for the research question? • Sampling representative? • Well planned and executed?
Results	• What facts are revealed by the work?	• Statement about each findings • Multifaceted and complex data • Links among data identified by the authors • Authors' interpretations	• Data presented accurate, organized? • Facts, opinions, or facts under certain assumptions? • Consistent? Logic? Assumptions reasonable?
Discussion	• What do the results mean? • What are the answers to the proposed questions?	• New points illuminated by results • How did or did not previous knowledge get changed by new findings? • Comparisons with the results of others and discuss the consequences of those comparisons.	• Argument strong or weak? (1) well-structured? (2)Clear? (3)Well-supported by relevant evidences in Results? (4)Logic?

* Analyze Major Sections of a Research Article



* Defining a Research Topic from a General Research Direction



* Research Methods

Challenges Identified from the Trial of UC 270

- Students showed initial interests to register for the course (10-15 people registered) but then gave up when semester was about to starts (only 3 students showed up on the first day)
- Course trial turned into a guided study
- Only one student finished the course
- Course load may be more appropriate for 3-credit hours
- Instructor may not be able to advise the research topic students selected
  - May need to form an instruction team with subject specialists in multiple disciplines

Student Feedback from the Trial of UC 270

Requested after grades submitted

- *"I really enjoyed taking this class, especially since this class was not like the lecture-style classes that I normally take at engineering school."*
- *"I do think I've benefited a lot from this class, especially for deciding about my future plan in going to graduate school."*
- *(Most valuable things learned from the course?)"Critical Thinking Skills, Especially when I had to design my own research to write the proposal; Reading scholarly journal articles, searching database, writing skills, reviewing articles."*

Student Feedback from the Trial of UC 270

* *"Currently, I am finding the class to be more demanding than a regular 2 credit 200-level course, based on the Mini-review comments you provided. The comments did help me a lot in enhancing my review article writing skills. However, I do not think I will be able to meet the criteria you gave as a feedback if I spend about 6 to 8 hours per week."*

* *"Maybe instead o f writing the mini-review, we could have just written informal reviews throughout the semester via blog. For example, every other week, I could read an article, and then write some brief summary about the article and its topic, and make some comments on the articles."*

* Do faculty and students view librarians as trusted instructors for research beyond topics directly around finding information ?

* Am I getting too far from our comfortable zone (our specialty) ?

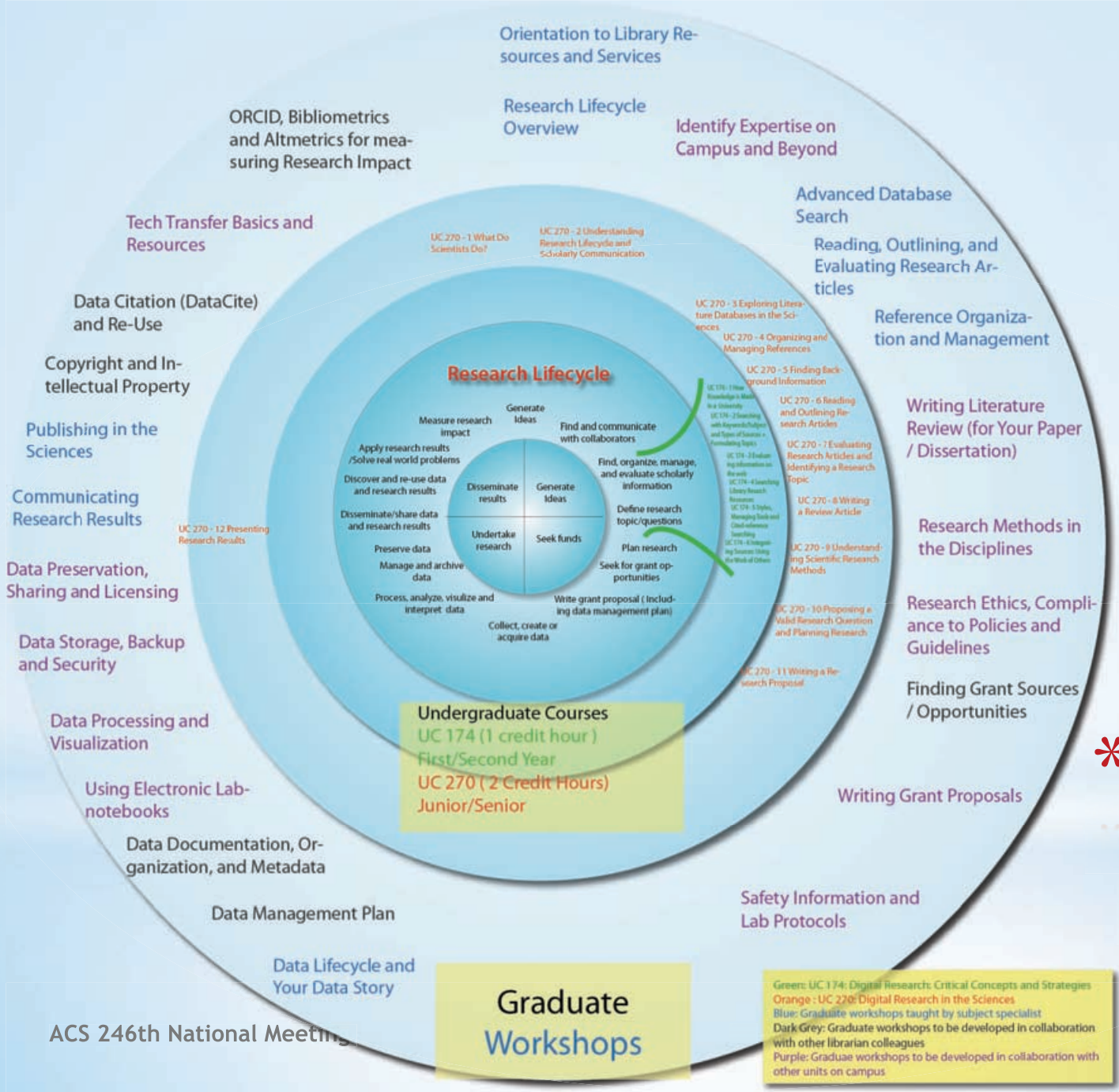
* Did I step on toes … ?

* Questions Remains…

*For Graduate Students

No for-credit courses.

Create workshop series around the Research Lifecycle.



M Library
University of Michigan

* Graduate Workshop Series

- Orientation to Library Resources and Services
- Research Lifecycle Overview
- Advanced Database Search
- Reading, Outlining and Evaluating Research Articles
- Reference Organization and Management
- Data Literacy Workshop Series
  - Data Lifecycle and Your Data Story
- Communicating Research Results
- Publishing in the Sciences

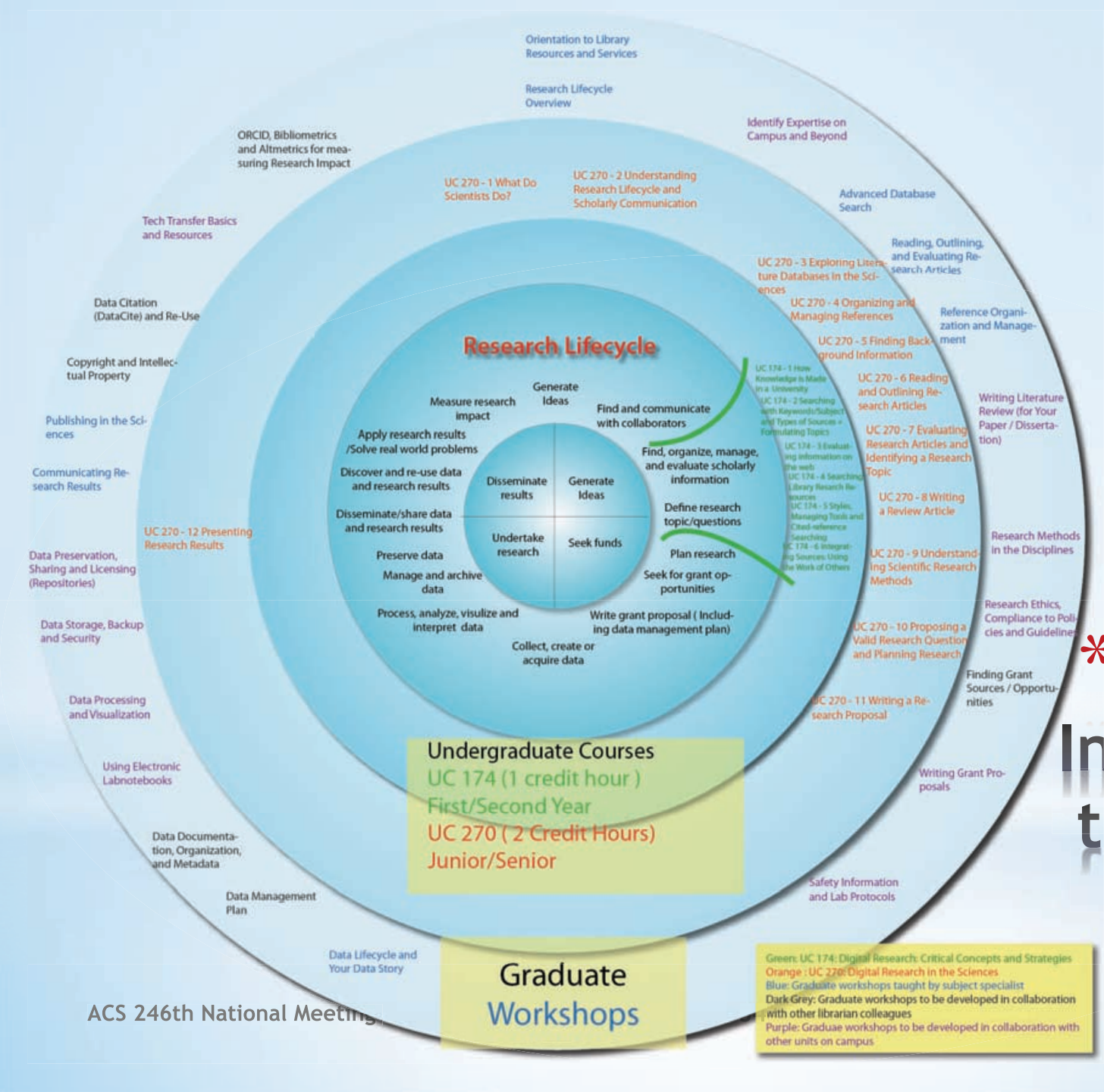
Workshop Delivered by Subject Specialists

Workshops	To collaborate with
Finding Grant Source/Opportunities	Grant Librarian
Data Management Plan	Data Librarian
Data Documentation, Organization, and Metadata	Data/metadata Librarian
Copyright and Intellectual Property	Copyright Librarian
Data Citation and Re-use	Data Librarian
ORCID, Bibliometrics and Altmetrics for Measuring Research Impact	Data Librarian

* Workshops to Collaborate with Other Librarians

Workshops	To Collaborate with
Identify Expertise on Campus and Beyond	Office of Vice President for Research
Writing Literature Review (for Your Paper / Dissertation)	Writing Center
Research Methods in the Disciplines	Faculty
Research Ethics, Compliance to Policies and Guidelines	Office of Vice President for Research
Writing Grant Proposal	Writing Center
Safety Information and Lab Protocols	Lab Safety Officers in Departments
Using Electronic Lab Notebooks	ITS
Data Processing and Visualization	ITS, Center for Statistical Computing and Analysis
Data Storage, Backup and Security	ITS
Data Preservation, Sharing and Licensing	Institutional Repository
Tech Transfer Basics and Resources	Tech Transfer

* Workshops to Collaborate with Other Units on Campus



* Designing Instructions throughout RLC

* Professors are Aiming at …

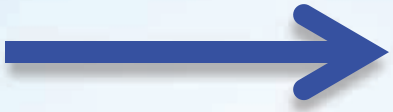
* … the primary goal of Science is not the research output but the people who do science – scientists, one generation after another…

* … start from deep and profound understanding of the subject matter and collaborate with students to find answers to interesting questions together …

* … work with student collaborators to translate how research is done to how education is done…

-- Summarized from Prof. Brian Coppola's talk at the 246th ACS National Meeting, Indy, IN, September 10, 2013

Designing instructions based on sources/ resources in our collection



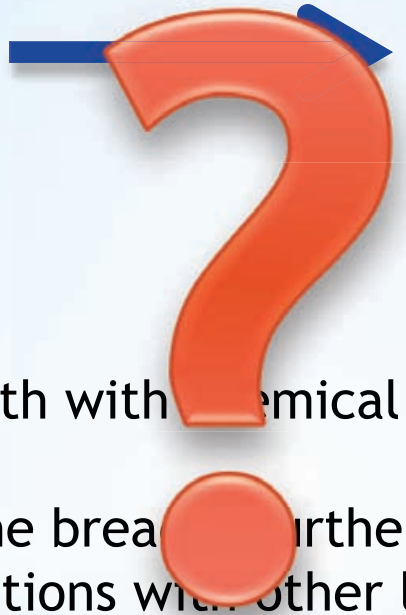
Designing instructions based on what's needed at each step of the research lifecycle

Continue going in-depth with chemical information literacy skills

Continue extending the breadth further throughout the research lifecycle via collaborations with other librarians and other units

* What's Next for Chemistry Librarian ?

Designing instructions based on sources/ resources in our collection



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* What's Next for Chemistry Librarian ?

* Acknowledgement

* Thank Doreen Bradley and the UC 174 instruction team at MLibrary for the UC 174 materials and their support to this work

* Thank my colleagues, especially members of the Research Lifecycle Committee at MLibrary for inspiring this work

* Thank all students participated in the UC 270 trial

Thank you!

Did I get carried away and lose the focus on our unique specialty ?

Contact Ye Li at liye@umich.edu