

UTSA CS 4593: CS-CURE

Course-based Undergraduate Research Experience in CS

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Week 4: Research Tools

UTSA CS-CURE

Week 4

- Objectives:
 - Learn common tools for research in CS
 - Leverage tools to facilitate, organize, & guide your research
- Deliverables:
 - Activity 3: Formulating Research Questions (in-class Thursday)
 - Quiz 1 (on Canvas)

Research Tools

Finding & leveraging effective resources

- Tools for...
 - Writing professional research
 - Organization of references
- *We'll explore some - you find what works for you!*

Tools for data later in the semester!

Tools for Conducting Research

Google Scholar

scholar.google.com

Read for free!

Find papers
that have
cited this one

Links to the
author's
profile page

The screenshot shows the Google Scholar interface with the search term "quantum algorithms" entered in the search bar. The results page displays several academic papers. A red arrow points from the text "Find papers that have cited this one" to the "Custom range" dropdown menu. Another red arrow points from the text "Links to the author's profile page" to the "include citations" checkbox. A third red arrow points from the text "Find papers like this one" to the bottom right corner of the results page.

Articles About 2,380,000 results (0.06 sec)

Any time **Quantum algorithms**
M Mosca - arXiv preprint arXiv:0808.0369, 2008 - arxiv.org
... Section 8 describes the **quantum** walk paradigm for **quantum algorithms** and summarizes ...
of adiabatic **algorithms**. Section 10 describes a family of “topological” **algorithms**. Section 11 ...
☆ Save 99 Cite Cited by 150 Related articles All 2 versions »

Sort by relevance [HTML] Quantum algorithms: an overview
A Montanaro - npj Quantum Information, 2016 - nature.com
... about **quantum algorithms**, 2–5 and we defer to these for details of the **algorithms** we cover
... In particular, we omit all discussion of how the **quantum algorithms** mentioned work. We will ...
☆ Save 99 Cite Cited by 712 Related articles All 16 versions

Any type [HTML] Variational quantum algorithms
M Cerezo, A Arrasmith, R Babbush... - Nature Reviews..., 2021 - nature.com
... **quantum** systems 2 or solve linear systems of equations 3 . In 2016, access to the first
cloud-based **quantum** ... implementations of the aforementioned **quantum algorithms** 5 . However, ...
☆ Save 99 Cite Cited by 1786 Related articles All 9 versions

Review articles [PDF] Quantum algorithms for algebraic problems
AM Childs, W Van Dam - Reviews of Modern Physics, 2010 - APS
... the theory of **quantum** computation, and such **algorithms** motivate the formidable ... **quantum**
computer. This article reviews the current state of **quantum algorithms**, focusing on **algorithms** ...
☆ Save 99 Cite Cited by 382 Related articles All 12 versions

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[PDF] arxiv.org [HTML] nature.com Full View [HTML] nature.com [PDF] aps.org

Find papers
like this one

Research Rabbit

<https://www.researchrabit.ai/>

- Interactive graphical reference manager & search
- Customize your own collections, share with collaborators, & integrate with tools.

The screenshot displays the Research Rabbit web application interface. On the left, a sidebar shows options for creating new collections, categories, and connecting to Zotero. Below this are sections for 'Uncategorized' and 'Shared with Me'. The main area is a graphical interface for managing research papers. It features a list of papers with their titles, authors, years, and abstracts. A 'Filter' bar at the top allows users to refine results by abstracts or comments. A 'Connections' section at the bottom indicates no connections between the current collection and papers. On the right, there are sections for exploring papers, people, and other content, along with export options and public collection settings. Several circular icons representing specific researchers are visible on the right side of the main interface.

DBLP.org

Computer Science Bibliography

- Resource for searching publications & scholars
- Automatically indexed, focused on CS venues only

The screenshot shows the homepage of dblp.org. At the top, there is a logo for "дблп computer science bibliography" with a yellow and blue geometric graphic. A banner says "Stop the war!" with a peace symbol. The top right features a navigation bar with links for "home", "browse", "search", "about", and "nfdi". Below the header is a search bar with a magnifying glass icon. To the right is a sidebar titled "Dagstuhl" with a dropdown menu. The main content area has a dark header "Welcome to dblp". Below it, there are links for "browse authors | editors" (A-Z), "browse journals" (A-Z by publisher), "browse conferences | workshops" (A-Z), "browse series" (CoRR, LNCS, etc.), and "browse monographs" (books, theses, etc.). A "dblp blog" section follows, featuring news items like "2024-01-01: 7 million publications" and "2023-05-22: DTD update May 2023". A "more statistics" section includes a chart of publications per year from 1993 to 2023, with categories like Book and Thesis, Conference and Workshop Papers, Books, Journal Articles, and Reference Works. Other sections include "XML data" and "RSS feeds".

arXiv.org

“archive”



- arXiv is a **free distribution service** and an open-access archive for nearly 2.4 million scholarly articles in the fields of physics, mathematics, computer science, quantitative biology, quantitative finance, statistics, electrical engineering and systems science, and economics.
- Materials on this site are ***not peer-reviewed*** by arXiv.

IMPORTANT

If you find a reference on arXiv, look for the **PUBLISHED** work -
only that will have been peer reviewed.

(“Other versions” on Google Scholar, for example)

Writing & Presentations

LaTeX

“LAY-tek” or “LAH-tek”

- Typesetting tool for professional-looking documents
 - *Mark-up language more like HTML, but for docs - not “WYSIWIG”*

```
\documentclass{article}  
\begin{document}  
First document. This is a simple example, with no extras.  
\end{document}
```

Overleaf

<http://www.overleaf.com>

- In-browser LaTeX editor (+ doc sharing similar to Google Docs!)
- Sign up for a **free** account.
- *Missed the in-class demo? Check out:*
 - Documentation: <https://www.overleaf.com/learn>
 - “Learn LaTeX in 30 minutes”: https://www.overleaf.com/learn/latex/Learn_LaTeX_in_30_minutes

Beamer

LaTeX class for presentations

About the Beamer class in presentation making
A short story

A. B. Arthur¹ J. Doe²

¹Faculty of Physics
Very Famous University

²Faculty of Chemistry
Very Famous University

Very Large Conference, April 2021



Arthur, Doe (VFU) | About Beamer | VLC 2021 1 / 8

<https://www.overleaf.com/learn/latex/Beamer>

Reference Managers

References in Professional Research

Importance

- Citing existing work properly is key to..
 - **Credibility & accuracy** - *supporting your claims*
 - **Transparency & reproducibility** - *allowing for others to build on your work*
 - **Professionalism & responsibility** - *meeting community requirements*

References in Professional Research

Formatting

- Different fields leverage different formats - e.g. APA, MLA, Chicago are common.
- In CS, we leverage **reference managers** and each publication venue dictates the format.

1. You add the bibtex reference to a file.
2. The style sheet formats it for you!

APA vs **MLA**

What is the topic of your research paper?

APA

Use this style for:
Sciences like natural, physical
and social sciences.

MLA

Use this style for:
Essays on human society,
culture, humanities, historical
literature and arts

COMPARE AND CONTRAST

In-text citations

(Author's Last Name, Year, Page Number)

Example:
(Jones, 2020, p. 15)

(Author's Last Name and Page Number)

Example:
(Jones 15)

Citations

Author's Last Name, Initial. *Title in sentence case. No period after URL.*

Example:
Austen, J. (1918.) *Pride and prejudice.*
Newton Press.

Author's Last Name, First Name. *Title in Title Case.*

Example:
Austen, Jane. *Pride and Prejudice.*
Newton Press, 1918.

Image source: [bibliography.com](https://www.bibliography.com)

Bibtex

“*bib-tex*” or “*bib-tek*”

- Tool for creating **bibliographic databases** & generating formatted references
- *Ensures accuracy and consistency of professional research!*
- **Resources:**
 - Bibtex Cheat Sheet: <https://www.bibtex.com/e/article-entry/>
 - Online Bibtex Editor: <https://www.bibme.org/bibtex>
 - Overleaf Bibtex Guide: https://www.overleaf.com/learn/latex/Bibliography_management_with_bibtex

Bibtex + Google Scholar

1. Find a paper
2. Below it, click “Cite”
3. Copy the citation - for BibTex, this opens a new page.
4. Copy & paste the bib reference into the .bib file in your project.

```
@article{miessen2023quantum,
  title={Quantum algorithms for quantum dynamics},
  author={Miessen, Alexander and Ollitrault, Pauline J and Tacchino, Francesco and Tavernelli, Ivano},
  journal={Nature Computational Science},
  volume={3},
  number={1},
  pages={25--37},
  year={2023},
  publisher={Nature Publishing Group US New York}
}
```

The screenshot shows a Google Scholar search results page for the query "quantum algorithms". The search bar at the top contains the query. Below the search bar, there are filters for "Articles", "Any time", "Since 2024", "Since 2023", "Since 2020", and "Custom range...". There are also sorting options: "Sort by relevance" (selected), "Sort by date", and "Any type" which includes "Review articles". Other filter options include "include patents" (unchecked) and "include citations" (checked). A "Create alert" button is also present. The main results section displays a list of papers. The first result is a highlighted paper by Miessen et al. titled "Quantum algorithms for quantum dynamics" published in Nature Computational Science. Below the abstract, there are citation options for different styles: MLA, APA, Chicago, Harvard, and Vancouver. Each style provides a formatted citation. At the bottom of the citation card, there are links for "BibTeX", "EndNote", "RefMan", and "RefWorks". The page also features "Related searches" for "variational quantum algorithms", "noisy quantum algorithms", "quantum algorithms equations", and "grand unification quantum algorithms".

quantum algorithms

Articles About 23,000 results (0.09 sec)

Any time [HTML] Quantum algorithms for quantum dynamics

Since 2024 A Miessen, PJ Ollitrault, F Tacchino... - Nature Computational ..., 2023 - nature.com

Since 2023 ... Among the many computational challenges faced across different disciplines, quantum

Since 2020 quantum techn...

Custom range... ☆ Save Cite

Sort by relevance [HTML] Quantum algorithms for quantum dynamics

Sort by date AM Dalzell, S M ... of quantum

Any type state-of-the-art c...

Review articles ☆ Save Cite

include patents [HTML] Near-t

include citations algorithms, simulation

HL Huang, XY ... the capabilities

Create alert [HTML] Limitations of the approach

G De Palma, M ...] that such va

BibTeX EndNote RefMan RefWorks

Harvard Miessen, A., Ollitrault, P.J., Tacchino, F. and Tavernelli, I., 2023. Quantum algorithms for quantum dynamics. *Nature Computational Science*, 3(1), pp.25-37.

Vancouver Miessen A, Ollitrault PJ, Tacchino F, Tavernelli I. Quantum algorithms for quantum dynamics. *Nature Computational Science*. 2023 Jan;3(1):25-37.

[PDF] arxiv.org [HTML] springer.com [PDF] aps.org

Related searches

variational quantum algorithms quantum algorithms equations

noisy quantum algorithms grand unification quantum algorithms

Zotero

Reference management

- Free desktop/mobile app
- Free collaboration

The screenshot shows the Zotero application interface. On the left, there is a sidebar with a tree view of 'My Library' containing folders like 'Book Reviews', 'Colonial Medicine' (which is selected), 'Dissertation', 'Science and Empire', 'Teaching' (with sub-folders 'Mapping', 'Open Access', 'Text Mining', 'Visualization'), 'My Publications', 'Duplicate Items', and 'Trash'. Below this are sections for 'Group Libraries' (with 'Grant Proposal', 'Research Lab', and 'Topic Modeling') and 'To Read' (with items like '19th century Acclimatization Aged', 'Appetite Blood Cemetery Children Climate', etc.). A search bar is at the bottom of the sidebar.

The main area displays a list of references in a table format. The columns are 'Title', 'Creator', and 'Year'. The table contains numerous entries, many of which are related to 'Colonial Medicine'. One entry, 'Circulation of Medicine in the Early Modern Atlantic World' by Cook and Walker (2013), is selected and expanded, showing its full text PDF and other details. To the right of the table, there is a detailed view pane with tabs for 'Info', 'Notes', 'Tags', and 'Related'. The 'Info' tab is active, showing fields such as Item Type (Journal Article), Title (Circulation of Medicine in the Early Modern Atlantic World), Author (Cook, Harold J. and Walker, Timothy D.), Abstract (The search for powerful drugs has caused people and commodities to move around the globe for many centuries, as it still does...), Publication (Social History of Medicine), Volume (26), Issue (3), Pages (337-351), Date (2013/08/01), Series (y m d), Series Title, Series Text, Journal Abbr (Soc Hist Med), Language (en), DOI (10.1093/shm/hkt013), ISSN (0951-631X), Short Title, URL (<https://academic.oup.com/shm/article/26/3/337>), Accessed (1/24/2018, 10:17:12 AM), Archive, Loc. in Archive, Library Catalog, Call Number, Rights, Extra, Date Added (1/24/2018, 10:17:12 AM), and Modified (1/24/2018, 11:50:15 AM).

Mendeley

Reference management

- Free desktop/mobile app
- Free collaboration
- SSO with UTSA login

The screenshot shows the Mendeley desktop application interface. On the left is a dark sidebar with icons for adding new references, collections, groups, and settings. The main area is titled "All References" and displays a list of publications. The columns are labeled "AUTHORS", "YEAR", "TITLE", and "SOURCE". The first few entries are:

	AUTHORS	YEAR	TITLE	SOURCE
<input type="checkbox"/>	Tran R, Patrick D, Gey...	2020	Sad: Saliency-based defenses against adversarial examples	arXiv
<input type="checkbox"/>	Haider S, Akhunzada A...	2020	A Deep CNN Ensemble Framework for Efficient DDoS Attack Detection i...	IEEE Acc...
<input type="checkbox"/>	Moradi H, Wang W, Fe...	2020	UPredict: A User-Level Profiler-Based Predictive Framework in Multi-Ten...	Proceedin...
<input type="checkbox"/>	Haider W, Moustafa N, ...	2020	FGMC-HADS: Fuzzy Gaussian mixture-based correntropy models for de...	Computer...
<input type="checkbox"/>	Fernandez A	2019	On the Salience of Adversarial Examples	Lecture N...
<input type="checkbox"/>	Perry J, Fernandez A	2019	MinENet: A dilated CNN for semantic segmentation of eye features	Proceedin...

Below the main list, there are sections for "COLLECTIONS" (New Collection) and "GROUPS" (New Group).

	Mendeley	Zotero
Focus	Originally for managing PDFs & social aspects	Reference management & integration
Data storage	2GB free	300MB free
Availability	Desktop apps & web apps	
Integration	MS Word, Google Docs, Overleaf	MS Word, Pages, Google Docs, Overleaf
Collaboration	Public & private groups	Free but limited
Additional Features	Note-taking & annotations within PDFs	Web capture for saving content from web pages

Research Project

Research Proposal & Outline

Project feedback

- Grade & **feedback on Canvas** (**almost complete - if you do not yet have a grade, it will show in the next 24hrs!*)

- **Next step = Research Outline**

Important Dates:

- Research Proposal Submission: **2/3 11:59pm CST**
- Proposal Feedback: **2/11**
- Research Outline Submission: **3/2 11:59pm CST**
- Research Draft Submission: **4/6 11:59pm CST**
- Draft Feedback: **4/15**
- Peer Reviews Due: **4/27 11:59pm CST**
- Research Paper Submission: **5/2 11:59pm CST**

Research Proposal & Outline

Project planning

- **Research Outline** is the next deliverable on your project
 - *Objectives:*
 - Leverage LaTeX to begin a professional research document
 - Learn to integrate Bibtex for references
 - Explore research project management
 - Outline plans for effective research on your topic

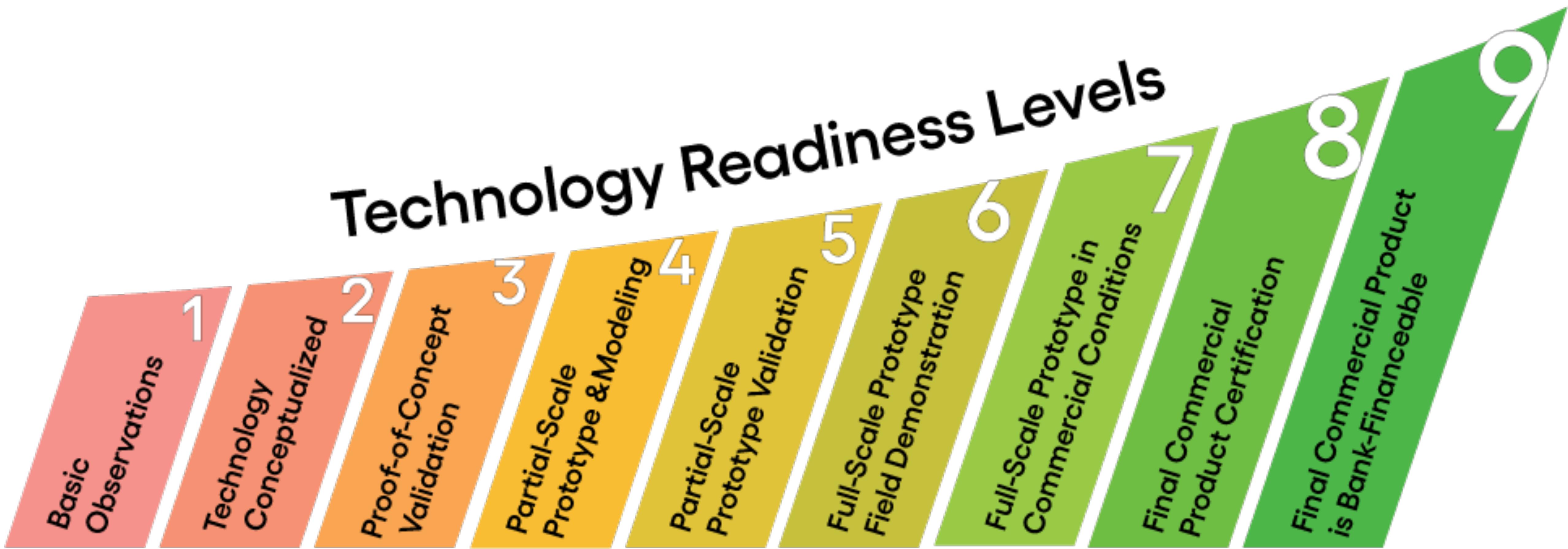
Wrap-Up

Tuesday

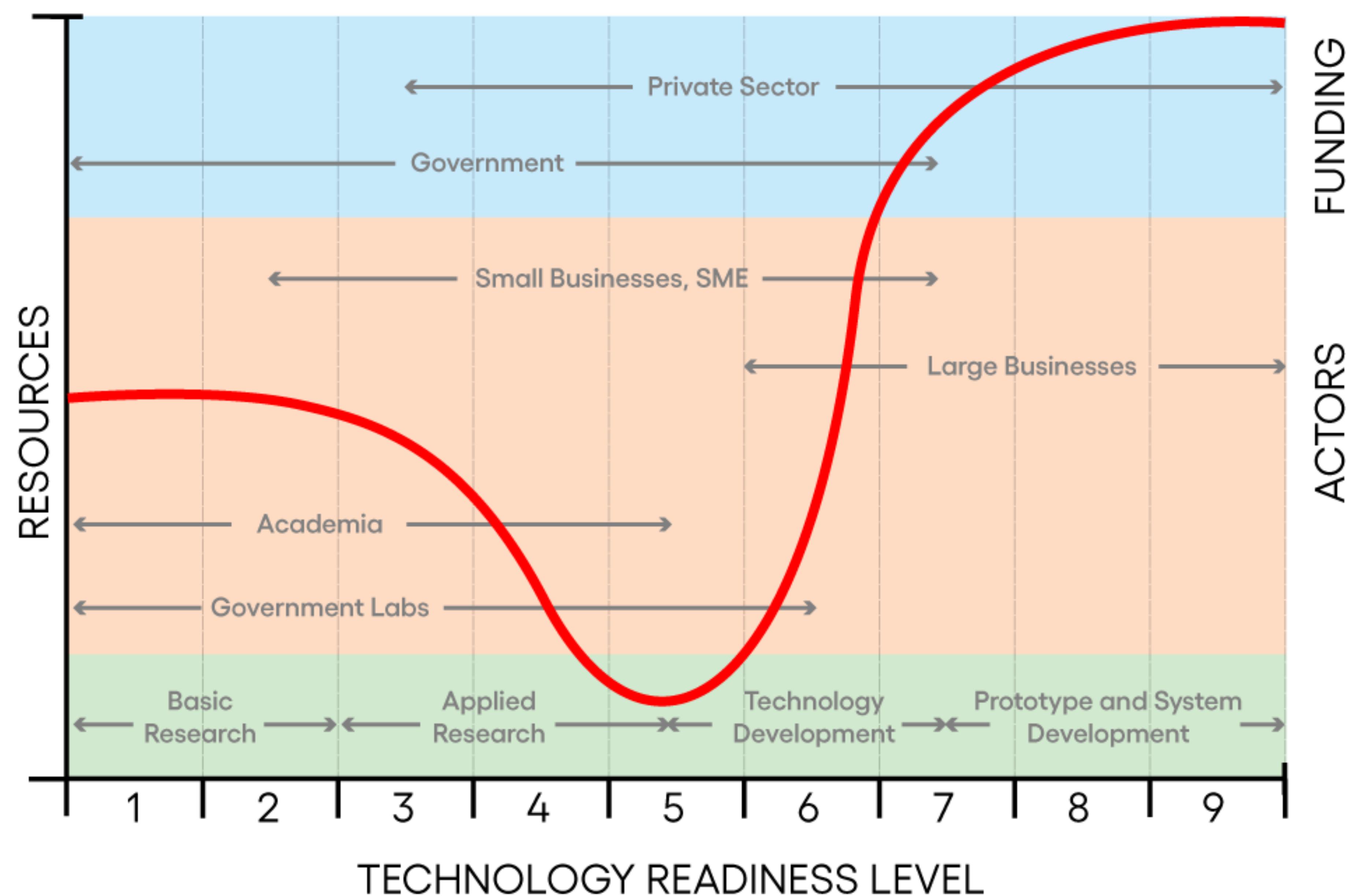
- Learn common tools for research in CS
- Leverage tools to facilitate, organize, & guide your research
- To Do:
 - Activity 3: Formulating Research Questions (in-class Thursday)
 - Quiz 1 (on Canvas)
 - **Review your proposal feedback** (on Canvas)

See you Thursday!

Activity 3: Formulating Research Questions



Wind Harvest



Source: Hensen, Jan & Loonen, Roel & Archontiki, Maria & Kanellis, Michalis. (2015). Using building simulation for moving innovations across the “Valley of Death.” REHVA Journal. 52. 58-62.

Wrap-Up

Thursday

- Leverage tools to facilitate, organize, & guide your research
- Create a research plan for investigating real, relevant topics
- To Do:
 - Activity 3: Formulating Research Questions (in-class Thursday)
 - Quiz 1 (on Canvas)
 - **Review your proposal feedback** (on Canvas)

See you next week!