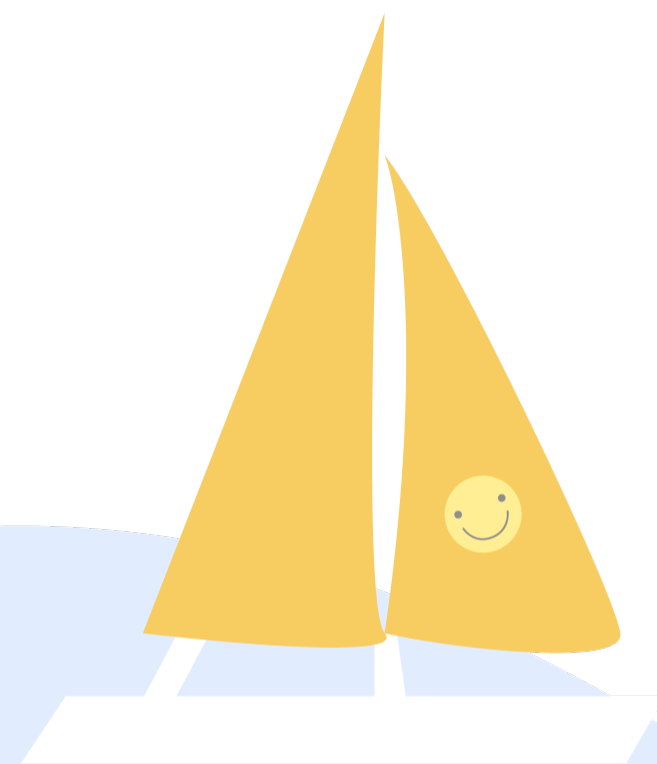


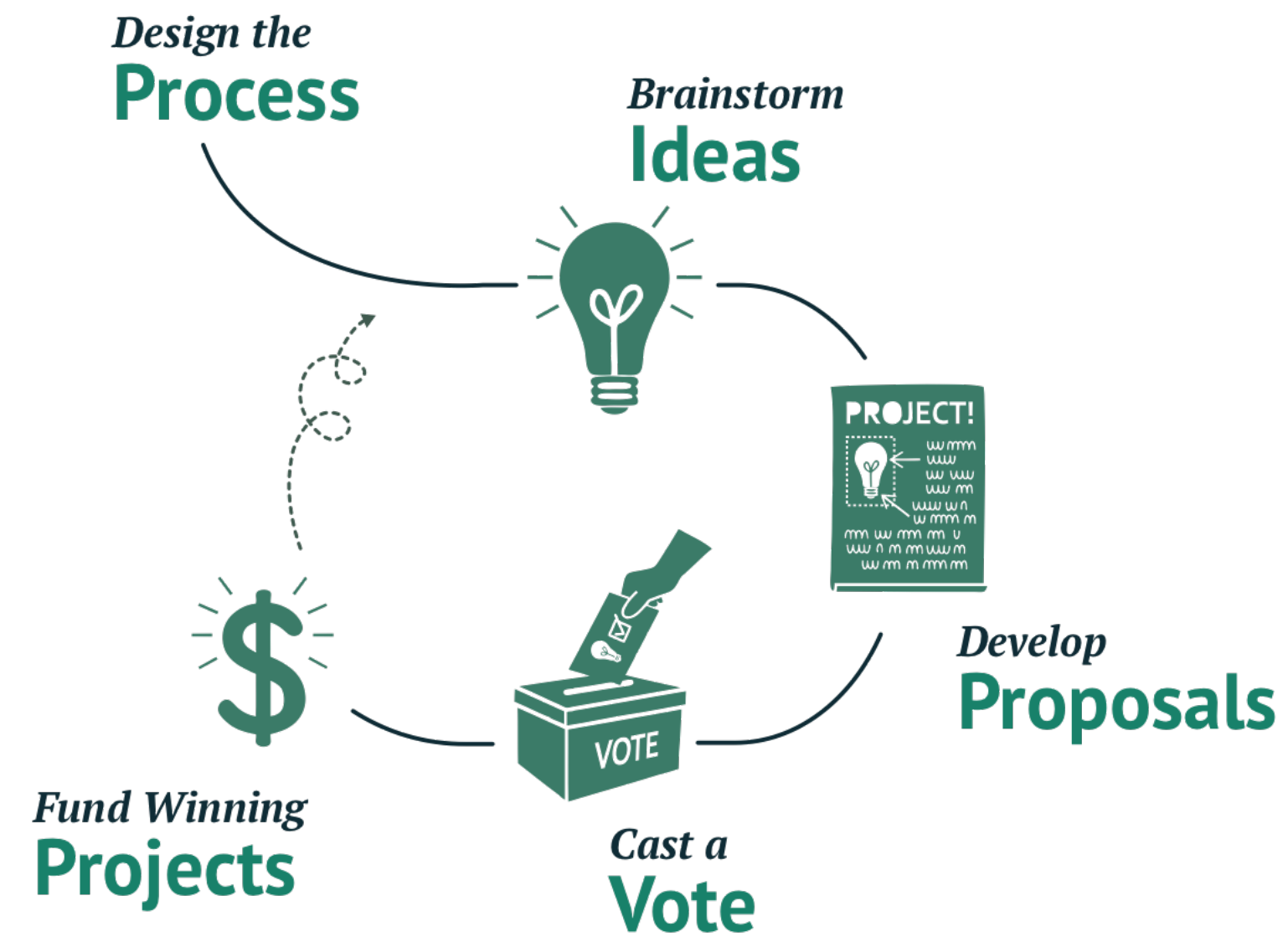
# Towards Community-Engaged Learning and Research in Engineering

David T. Lee, Tech4Good Lab

Assistant Professor, Computational Media, UCSC

All-In Conference, UC Santa Cruz | 10.27.2022





PARTICIPATORY  
BUDGETING PROJECT

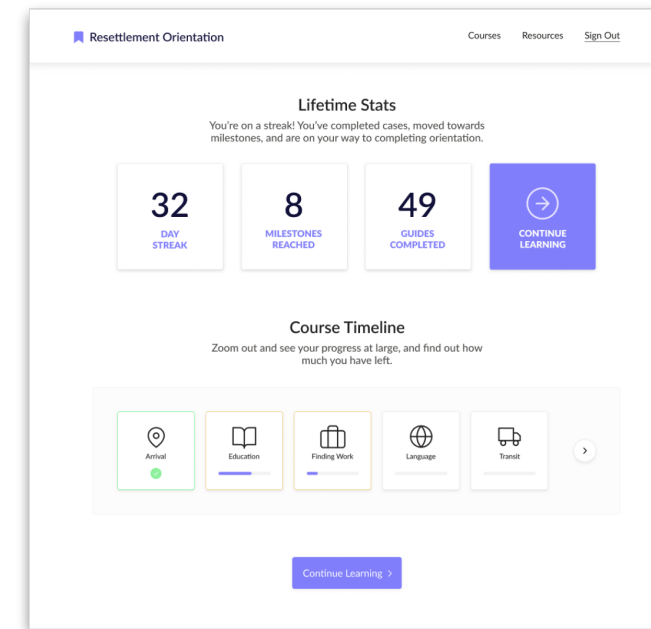


The Finnish Experiment: Crowdsourcing Off-road Traffic Law Reform

# Soul searching...

*Decided to jump to a new research community,  
Human-Computer Interaction (HCI)*

How can we organize volunteers  
to build apps for non-profits?



Catholic Charities Refugee Resettlement  
Cultural Orientation Guide

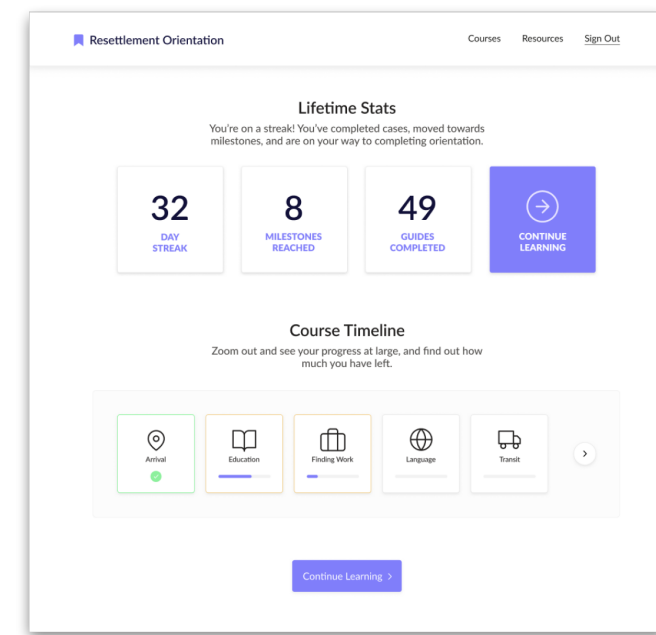
Causeway: Scaling Situated Learning via Micro-Role Hierarchies

David T. Lee, Emily S. Hamedian, Greg Wolff, Amy Liu

ACM Conference on Human Factors in Computing Systems (CHI) 2019

**Honorable Mention Award**

How can we organize volunteers to build apps for non-profits?



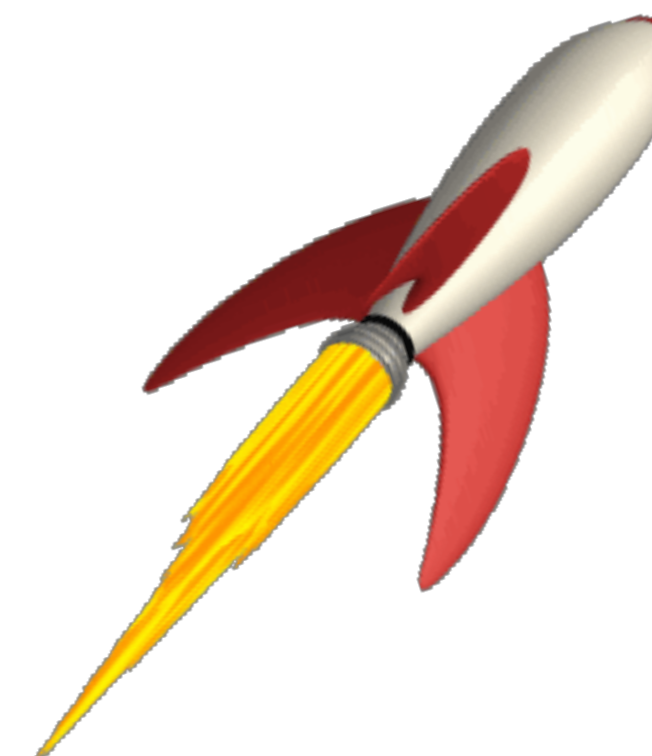
Catholic Charities Refugee Resettlement Cultural Orientation Guide



Even experienced people are “novices” but lots of interest!

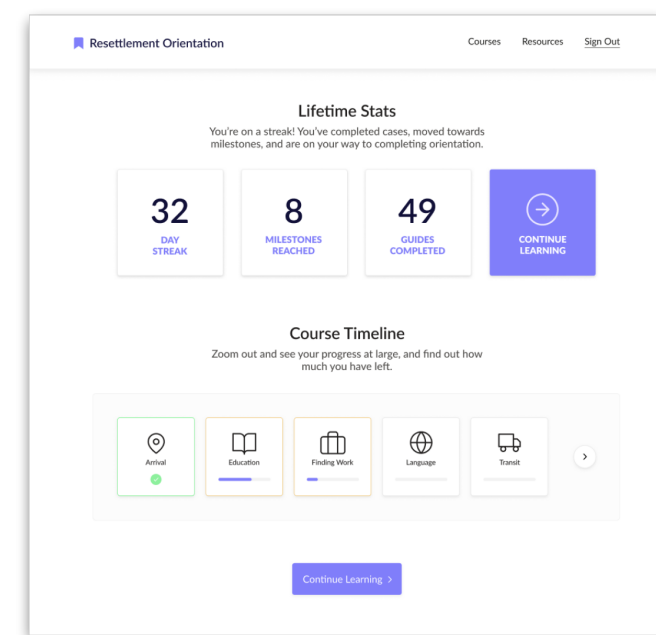


Detailed workflows are overwhelming but lots of interest!



It worked!  
(for a simple setting)

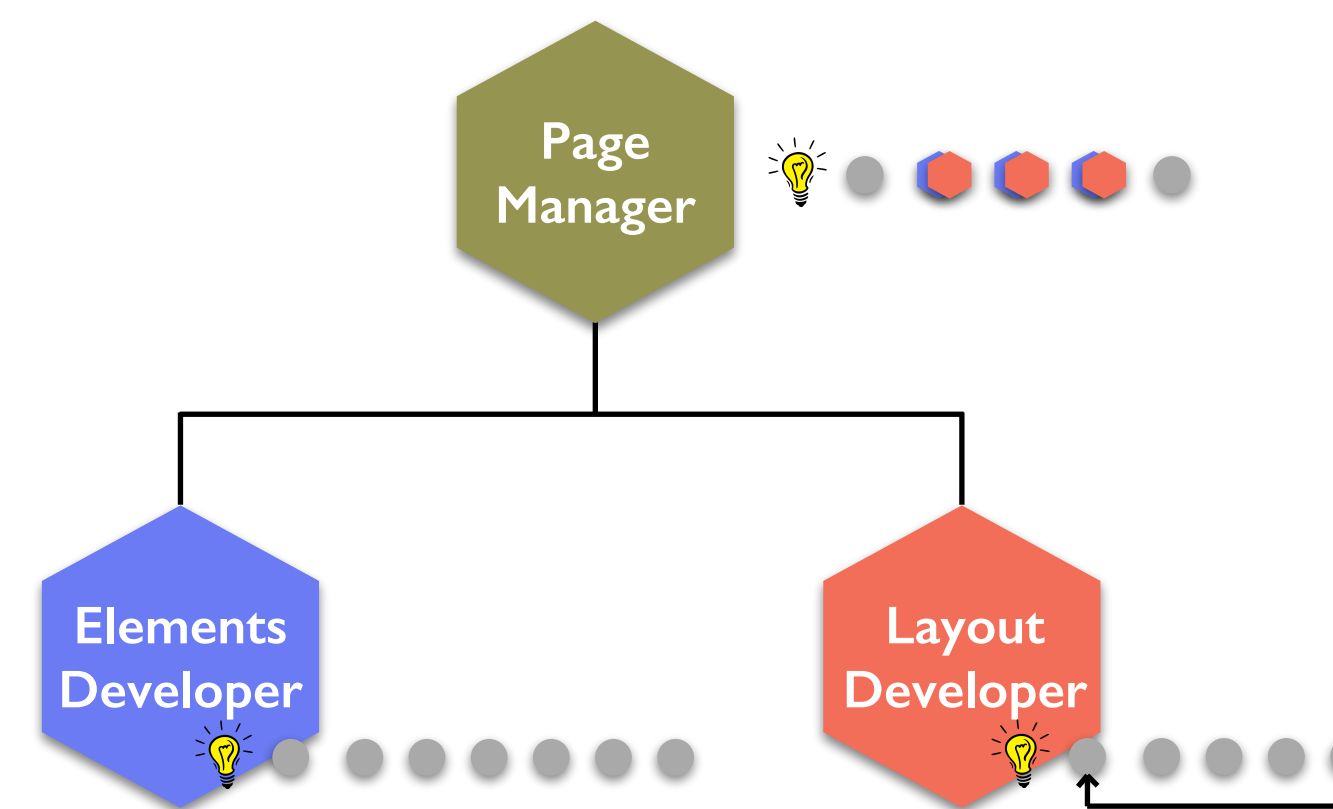
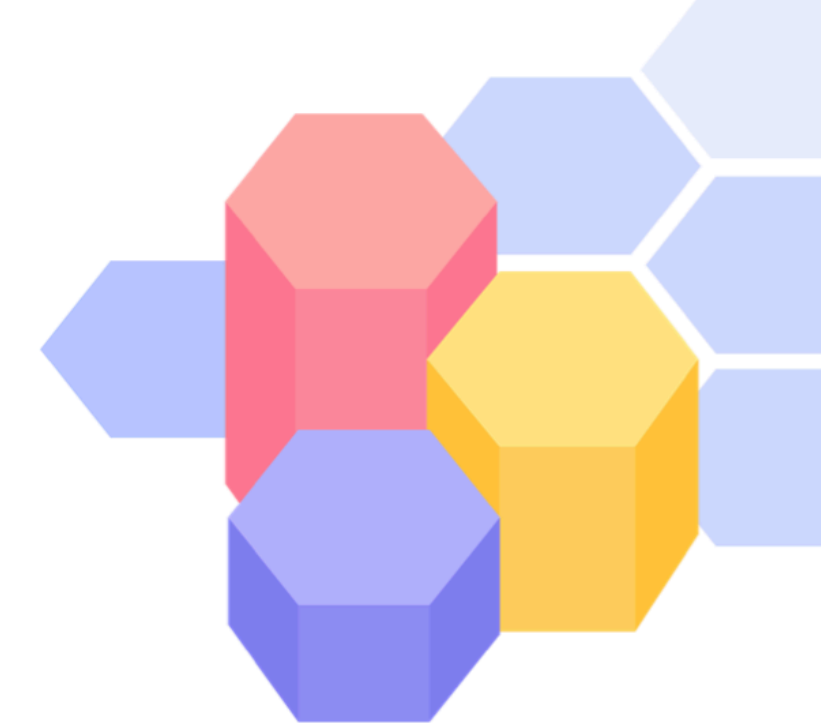
How can we organize volunteers to build apps for non-profits?



Catholic Charities Refugee Resettlement Cultural Orientation Guide

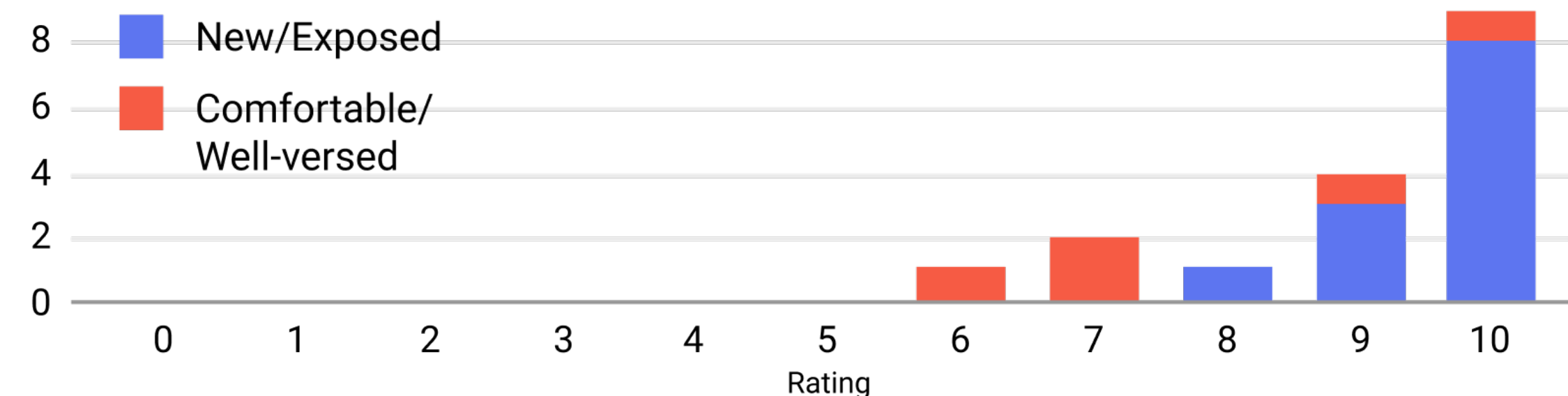
# Causeway

Learn real-world skills while supporting community causes



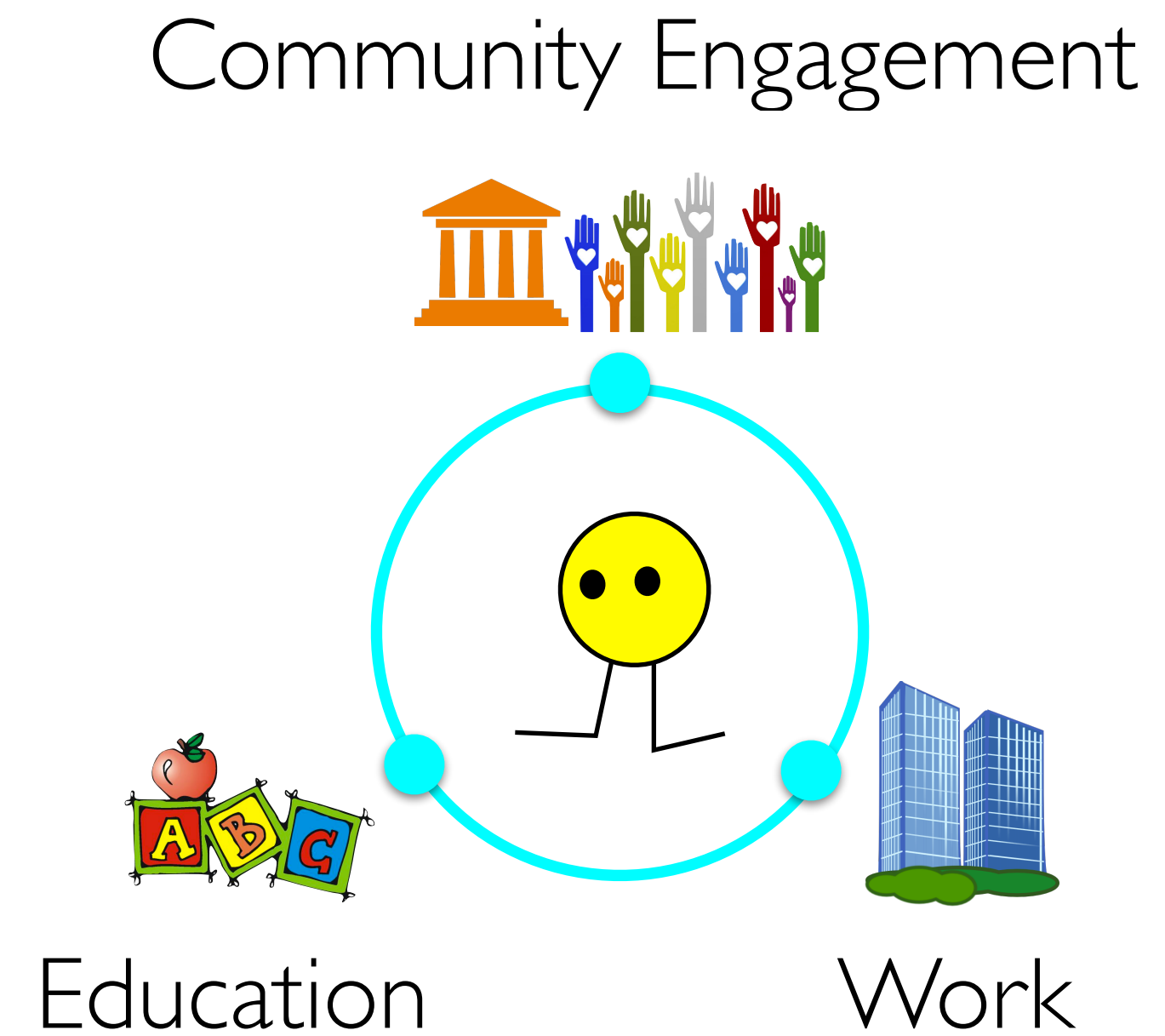
Micro-roles scaffold experiential learning and link it to projects

## Likelihood of recommending



# Our Vision

How might we more tightly integrate real-world experiential learning and community engagement?



# Tech4Good Lab & Collaboratory

Social computing  
HCI+AI+EconCS  
Community engaged  
Experiential learning

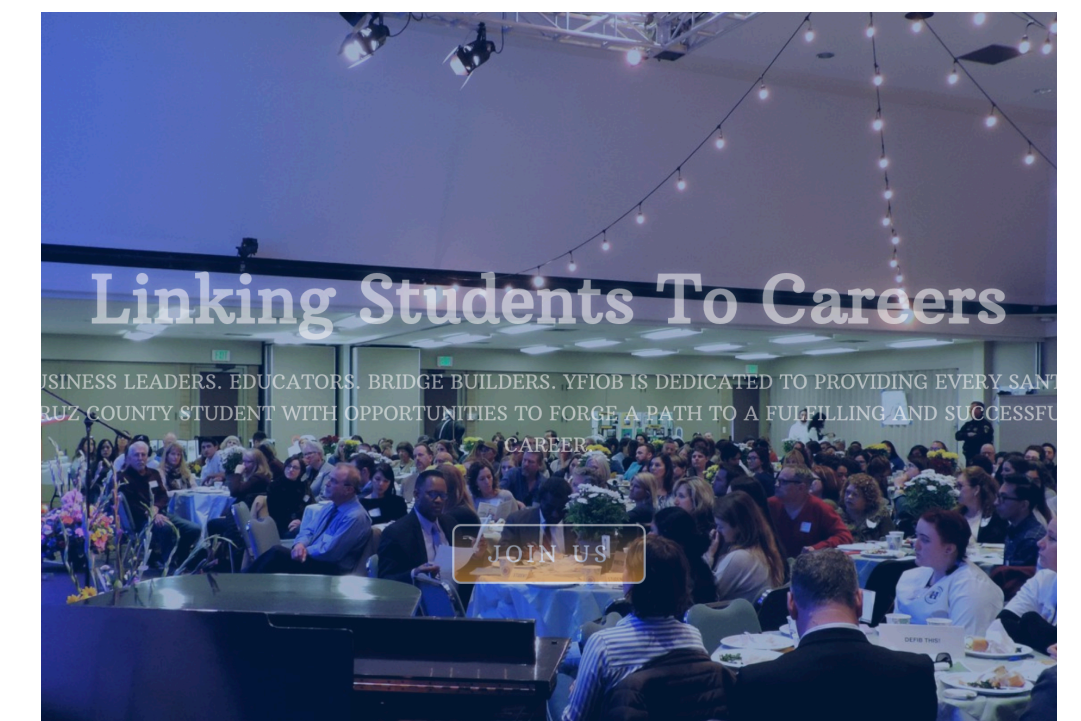


# Course-Based Consultancy

Business Strategy and Info. Systems  
Human Centered Design Research



YOUR FUTURE  
IS OUR BUSINESS





# 1 Course-based community consultancy

How might we provide real-world, experiential, community-engaged learning in large courses with 100+ students?

# **Strategic assessment and design exploration**

YOUR FUTURE  
IS OUR BUSINESS

1

Phase One  
Landscape Analysis

2

Phase Two  
Stakeholder Experience

3

Phase Three  
Future State Design

4

Phase Four  
Design Exploration

# Business Strategy and Information Systems

## Strategic assessment and design exploration

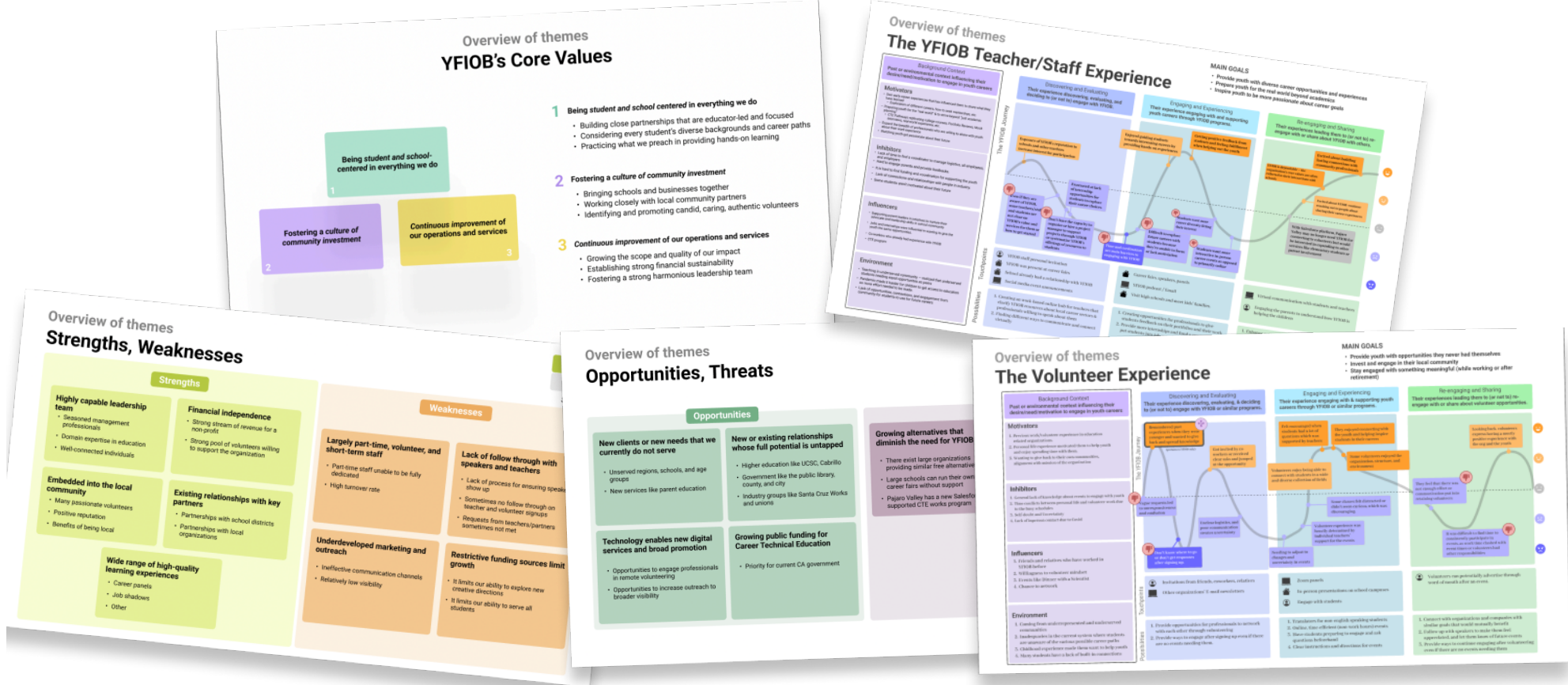
YOUR FUTURE  
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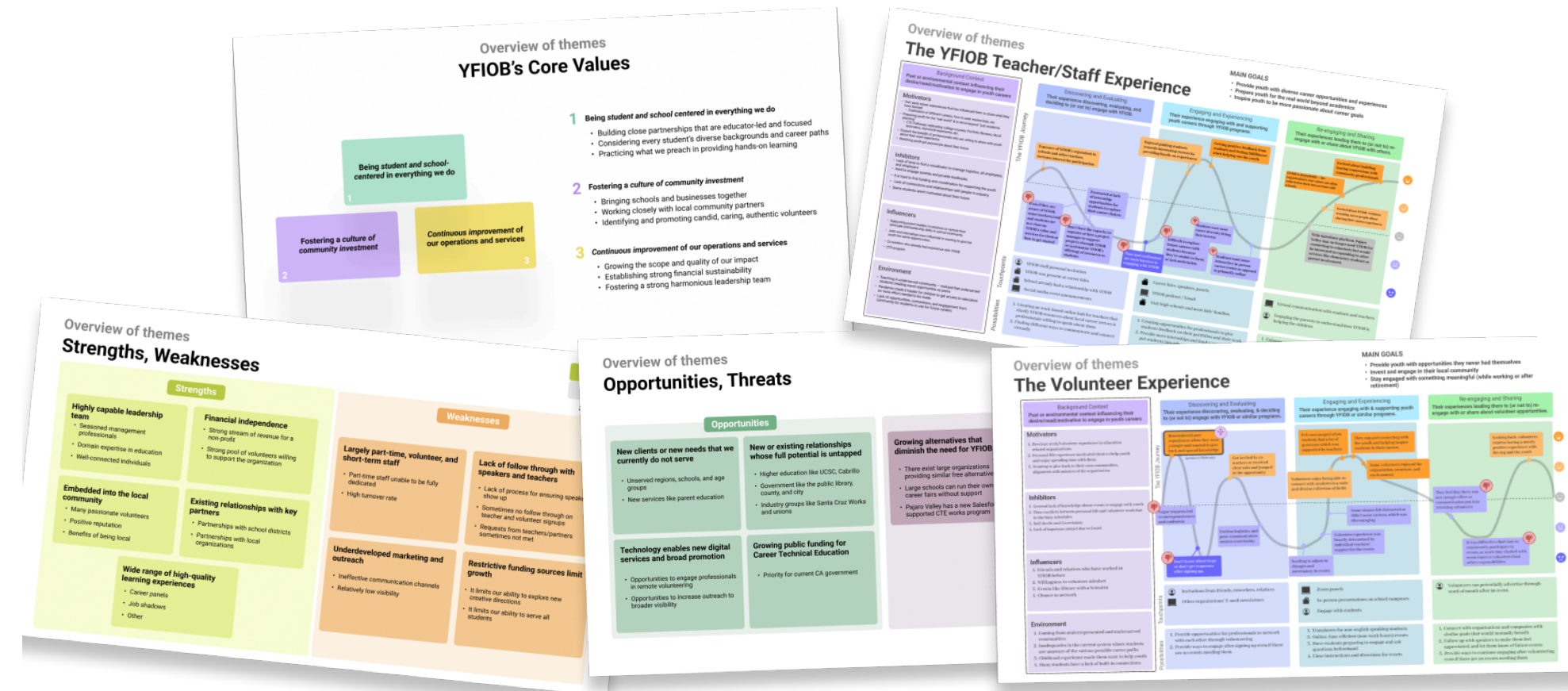
# Business Strategy and Information Systems

## Strategic assessment and design exploration

YOUR FUTURE  
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Phase One  
Landscape Analysis



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# Business Strategy and Information Systems

## Strategic assessment and design exploration

YOUR FUTURE  
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Phase One  
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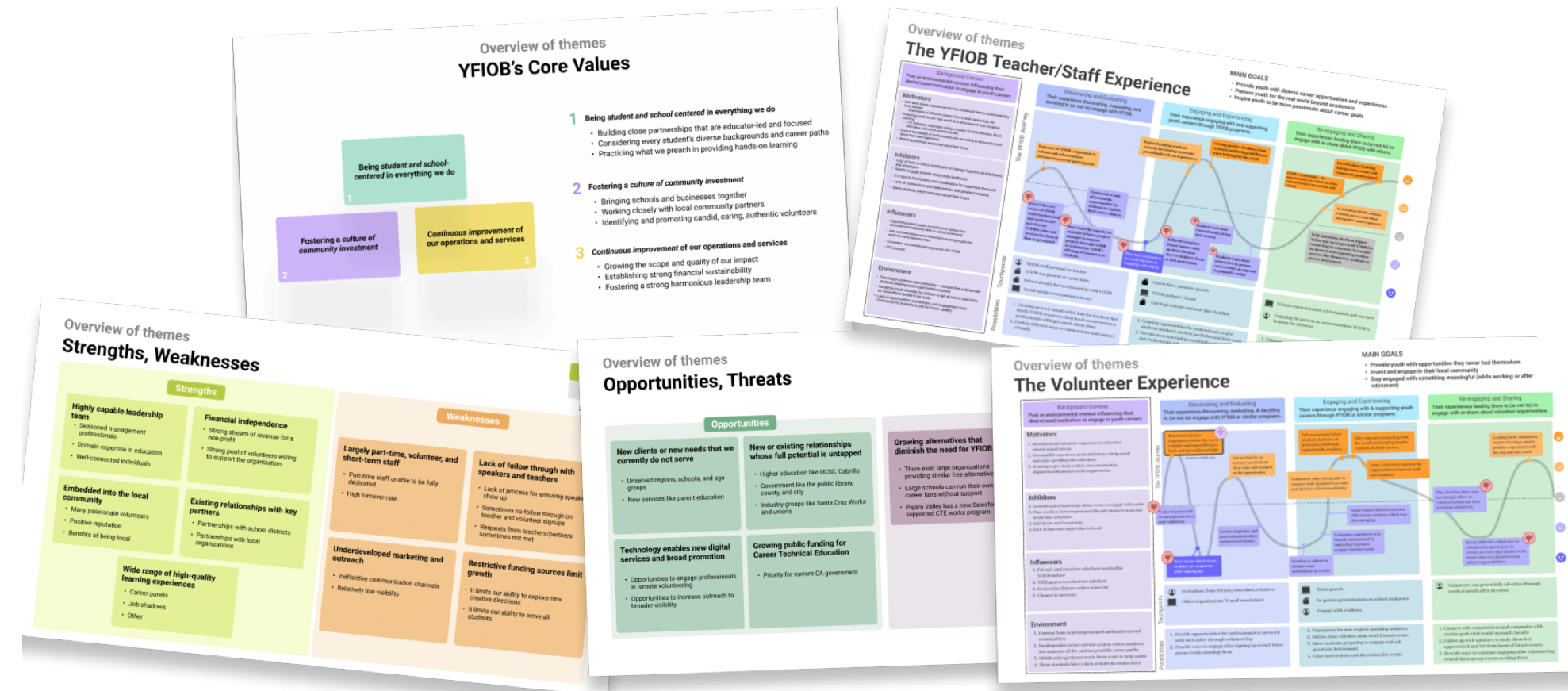
Phase Two  
Stakeholder Experience

3

Phase Three  
Future State Design

4

Phase Four  
Design Exploration



A single project partner that all 100+ students of the course are organized around supporting

A portfolio of deliverables balancing user research, no-code implementation, and concept prototyping

A foundation to build on in other engineering courses or labs with limited time for user research



T W R F S | S M T W R F S | S M T

Thematic Analysis

Team synthesis S

L Instructor Critique

# Phase 1: Landscape Analysis Structuring learning after the workplace

HW 1

## Research Questions

Organizational Values

Strengths and Weaknesses

Opportunities and Threats

## Divisions

1 2 3 4 5 6 7 8

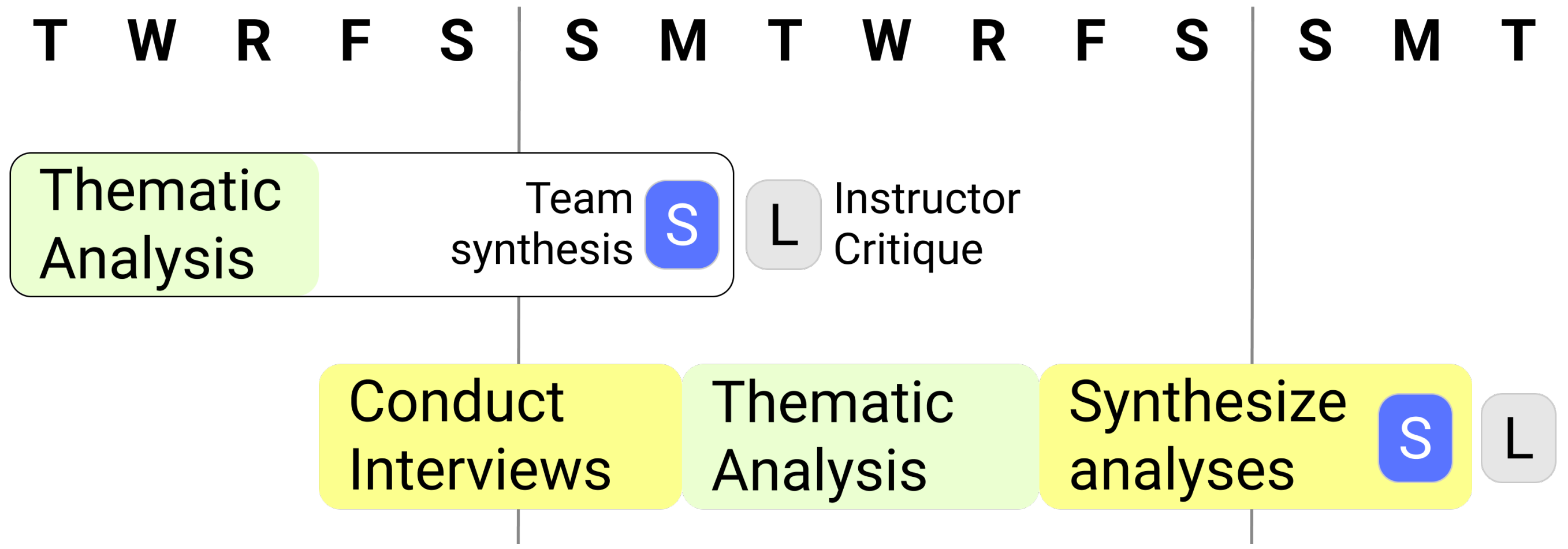
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HW 1: Jump in with thematic analysis of instructor interviews

# Phase 1: Landscape Analysis Structuring learning after the workplace



## Research Questions

- Organizational Values
- Strengths and Weaknesses
- Opportunities and Threats

	Divisions							
	1	2	3	4	5	6	7	8
Organizational Values	•	•	•	•	•	•	•	•
Strengths and Weaknesses	•	•	•	•	•	•	•	•
Opportunities and Threats	•	•	•	•	•	•	•	•

**HW 1:** Jump in with thematic analysis of instructor interviews

**HW 2:** Most practice thematic analysis on new interviews. Those who did well can conduct interviews or be a team lead working on synthesize analyses with other divisional leads



# Phase 1: Landscape Analysis Structuring learning after the workplace

T W R F S | S M T W R F S | S M T

**HW 1**

Thematic Analysis (green box) | Team synthesis (blue 'S' icon) | Instructor Critique (grey 'L' icon)

**HW 2**

Conduct Interviews (yellow box) | Thematic Analysis (green box) | Synthesize analyses (blue 'S' icon) | Instructor Critique (grey 'L' icon)

**HW 3**  
(or Extra Credit)

Finalize, Present (yellow box with grey 'L' icon)

## Research Questions

- Organizational Values
- Strengths and Weaknesses
- Opportunities and Threats

## Divisions

	1	2	3	4	5	6	7	8
•	•	•	•	•	•	•	•	•
•	•	•	•	•	•	•	•	•
•	•	•	•	•	•	•	•	•

**HW 1:** Jump in with thematic analysis of instructor interviews

**HW 2:** Most practice thematic analysis on new interviews. Those who did well can conduct interviews or be a team lead working on synthesize analyses with other divisional leads

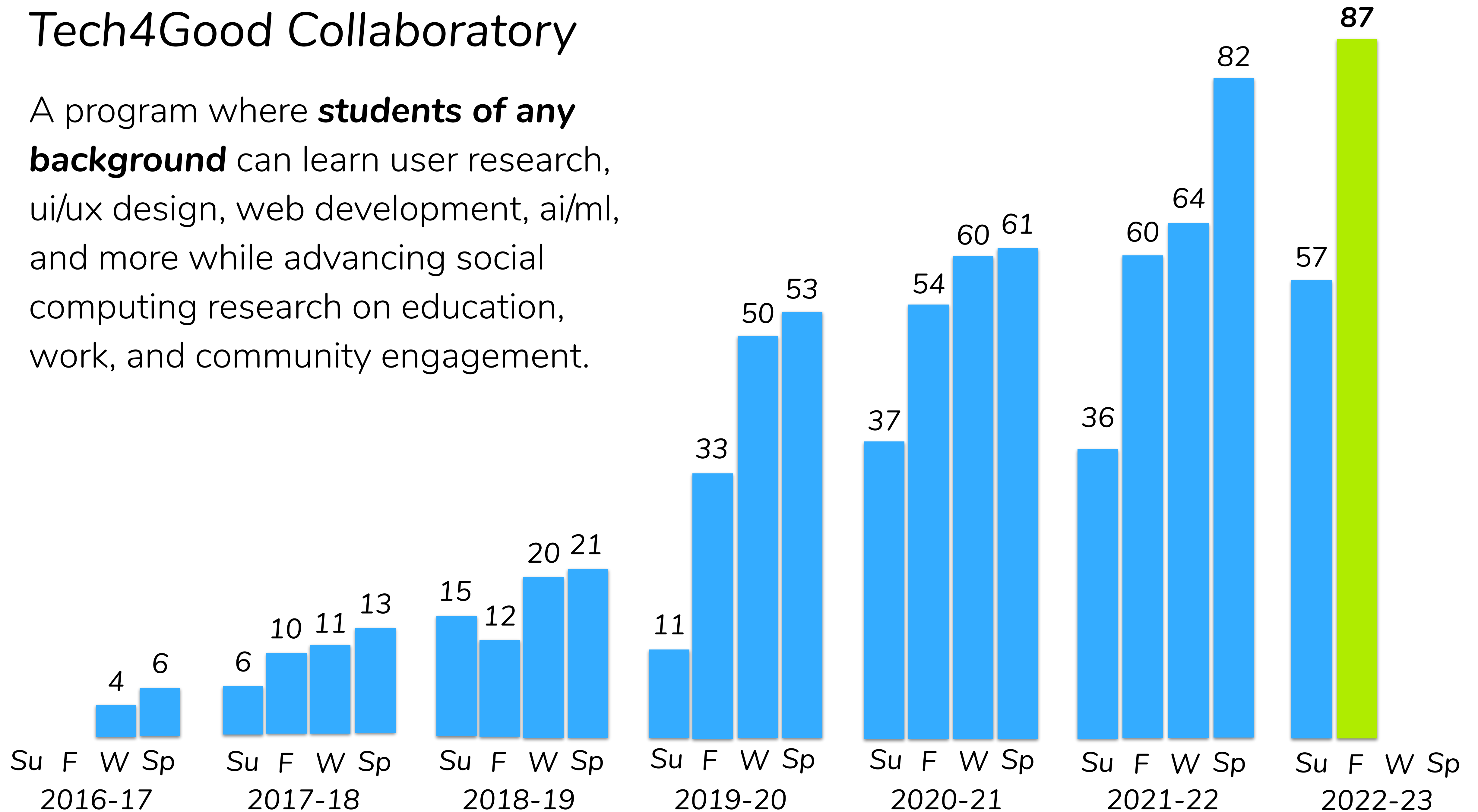
**HW 3:** Leads of the top division finalize and present the final report with staff support and a class-wide work session

# 2 Tech4Good Lab & Collaboratory

How might we better connect research with practical impact through experiential, community-engaged learning?

# Tech4Good Collaboratory

A program where **students of any background** can learn user research, ui/ux design, web development, ai/ml, and more while advancing social computing research on education, work, and community engagement.



## Skills Focused Teams

User Research  
Interface Design  
Web Development I  
Web Development II  
  
Deploy and Study  
Data and Analytics  
ML and NLP  
AI Economist

## Research Groups

### Scoping Stage

*Scope out a clear point of view to write a compelling 3-page study plan*

### Execution Stage

*Complete key aspects of the project to write a 6-page works-in-progress*

### Results Stage

*Collect and synthesize final results to write a 12-page conference paper*

## Learning Leadership

Goal-setting  
Delegation  
Coordination  
Mentorship  
Culture and process  
Feedback

# Research Focus Areas

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Apprenticeship Learning at Scale

Crowdsourcing & Learning in Groups

Career Journeys & Mentorship

Humane Futures of Crowd Work

Community & Societal Collaboration

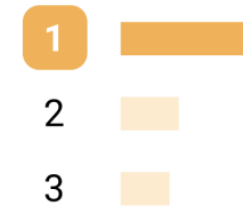
Human-AI Collaboration

# Developing Platforms

---



**Causeway.** Learning web dev while supporting community causes.



**Annota.** AI-enhanced platform for peer learning of qualitative analysis.



**Collectively.** Find others to learn together with or pursue similar goals.



**Compass.** Chat for industry professionals to mentor large groups of students.



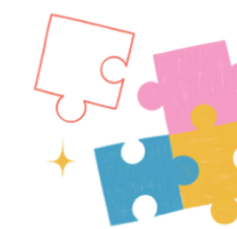
**Gratitude.** Browse, send, and receive collective expressions of gratitude.



**Dynamic Surveys.** Blend qual/quant data when learning from communities.



**Relate.** Team building activities that contribute to community discussions.



**Explore Careers.** Support career journeys using short-form social media videos.

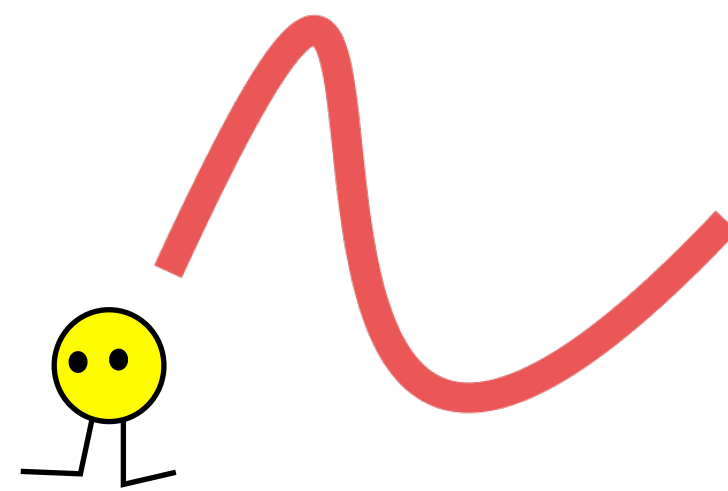


**Timely.** Scheduling app that helps you reach consensus on a time.

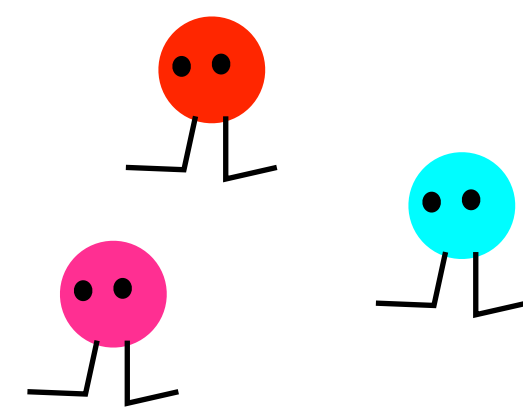
## Overall Theme of Projects

# Designing ecosystems to support individuals and communities in a whitewater world

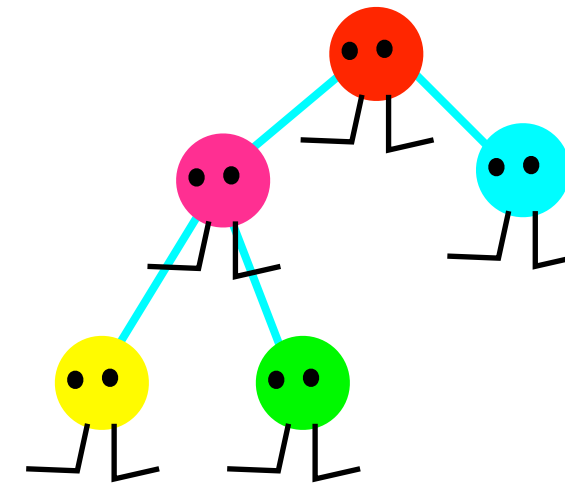
And about designing in ways that link thinking about supporting individuals with larger structured interactions in groups, organizations, or communities



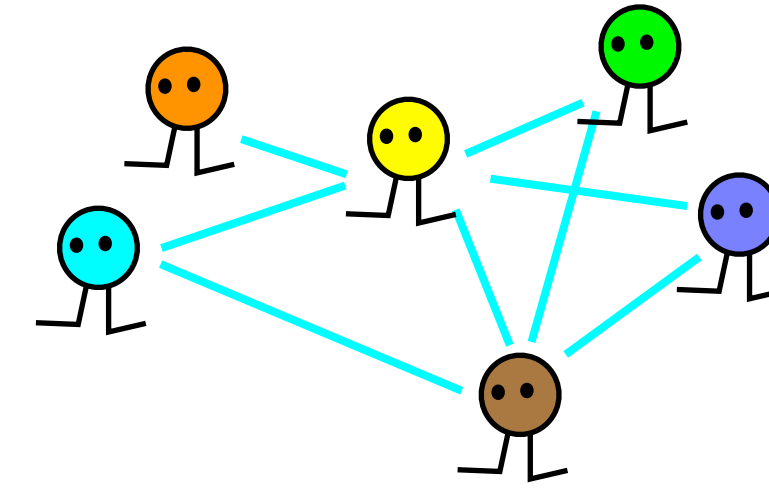
Highly tailored to personal journey



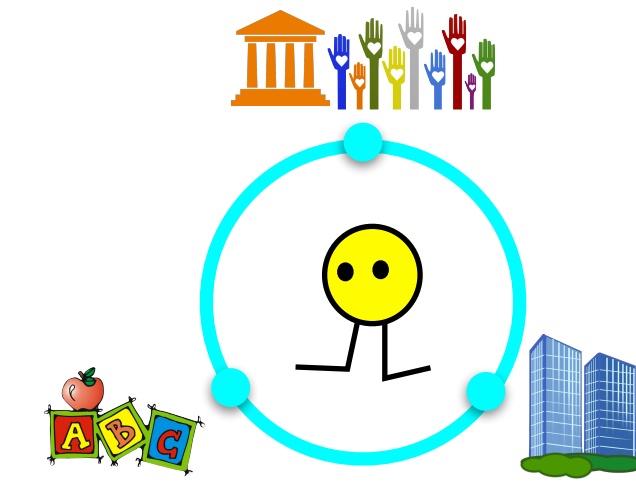
Relational interactions in small groups



Supported by org. structures



In networked communities

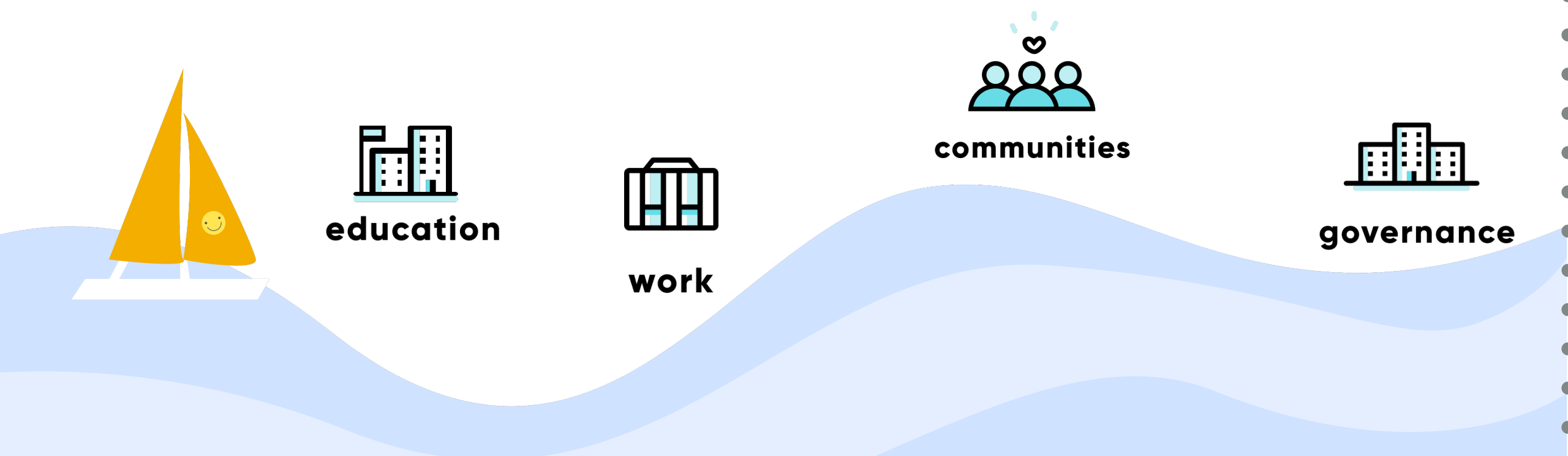


Fostering a flourishing political economy

# Tech4Good Lab

Social computing | HCI+AI+EconCS

Experiential community-engaged learning



## Thanks to our funders

UC Santa Cruz Foundation, Board Opportunity Fund

Baskin Engineering, Creative EDG2

CITRIS and the Banatao Institute, UCSC Campus Seed Funding

UCSC Student Success, GANAS, CUIP

New Venture Fund, PIT-UN Network Challenge

National Science Foundation, Improving Undergraduate STEM Education

+ many individual donors through Giving Day 2020-21

## PhD collaborators



## Undergraduate collaborators

(Just some of our leads and co-authors)

