Leading Change with Design Thinking

A collaborative model of course transformation with wicked problems

Agenda

- What is JMU X-Labs?
- What are wicked problems?
- Design thinking at two levels:
  - Transdisciplinary courses
  - Implementation and Assessment
- Leading change through course transformation

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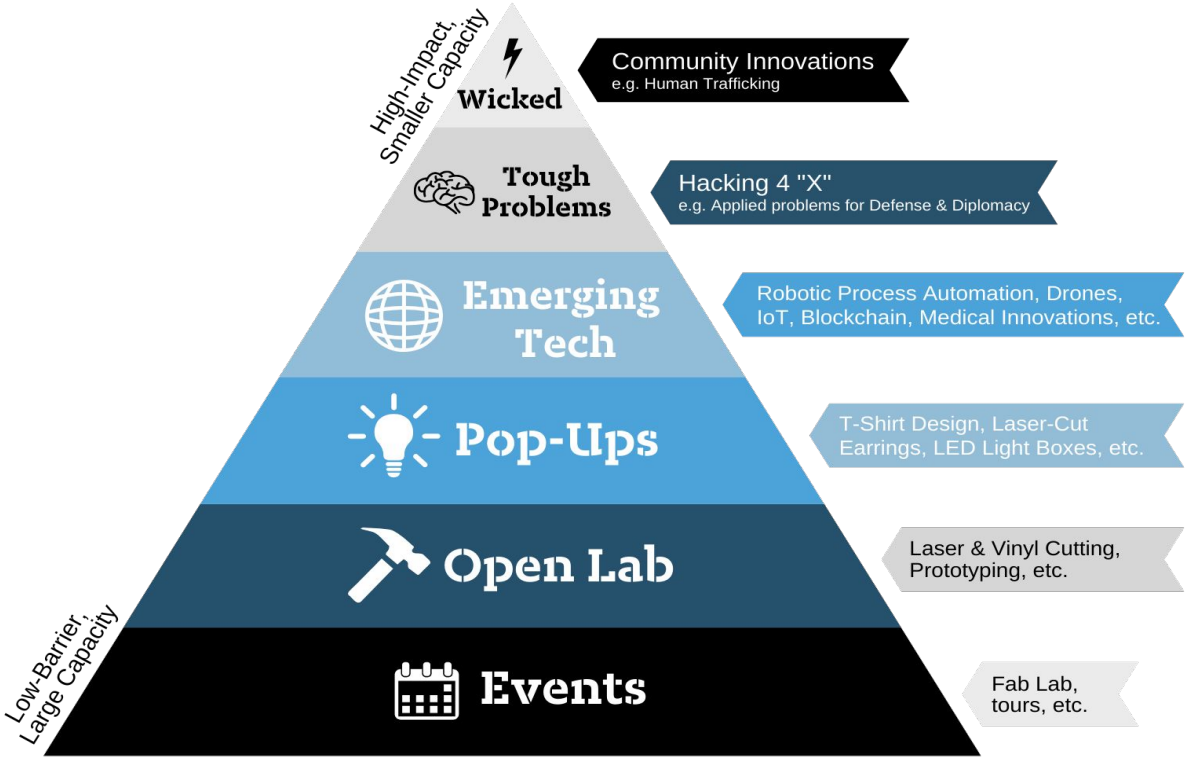
JMU X-Labs: The Space

- A discipline-agnostic space where faculty and students from different disciplines intersect with complex problems and external partners
- Movable furniture
- Prototyping technology (3D printers, laser cutters)

JMU X-Labs Programing: Our Innovation Ecosystem



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What are wicked problems?

A wicked problem is difficult to define and intractable for many reasons, including:

- incomplete or contradictory knowledge,
- the number of people and options involved,
- the large economic burden,
- the interconnected nature of the problem with other problems.

Wicked Problems at JMU X-Labs

Opioid Crisis

Human trafficking

Information warfare

Preventing hate crimes

Countering radicalization

Income Insecurity

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How do we source them?

- Students/Faculty
- Outside sources
  - Industry
  - Government
  - Community
  - Alumni
- Partnerships with institutions doing similar work
  - Hacking 4 Defense/Diplomacy

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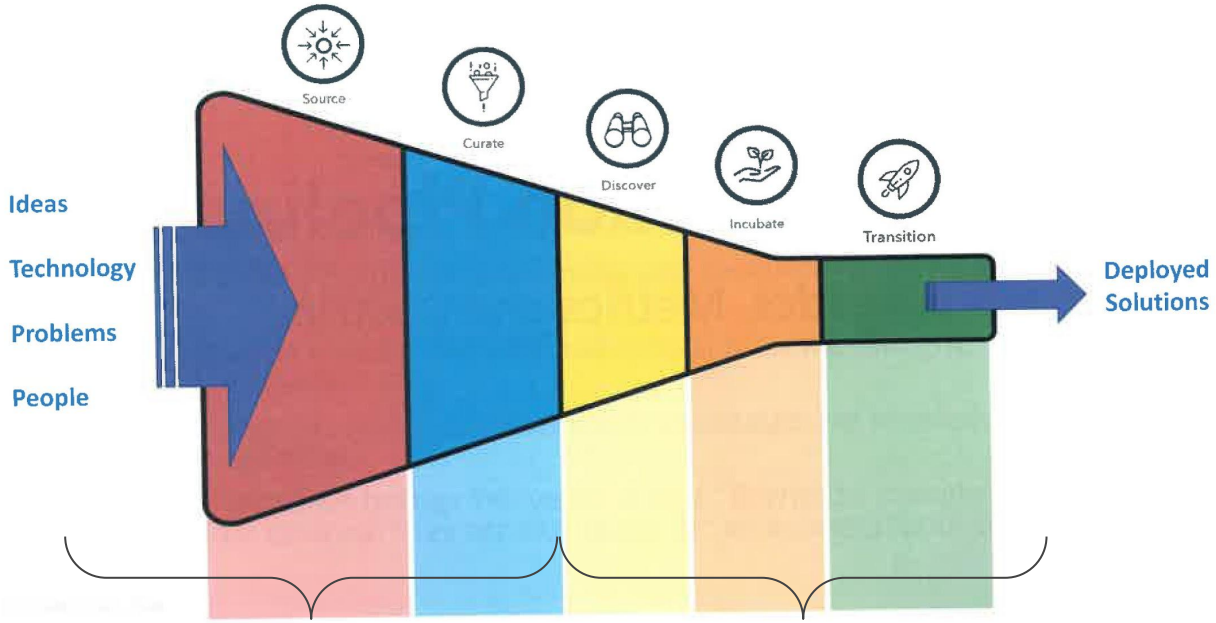
Curating the problems for undergraduates



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Chat question

What wicked problems might be compelling to address on your campus?

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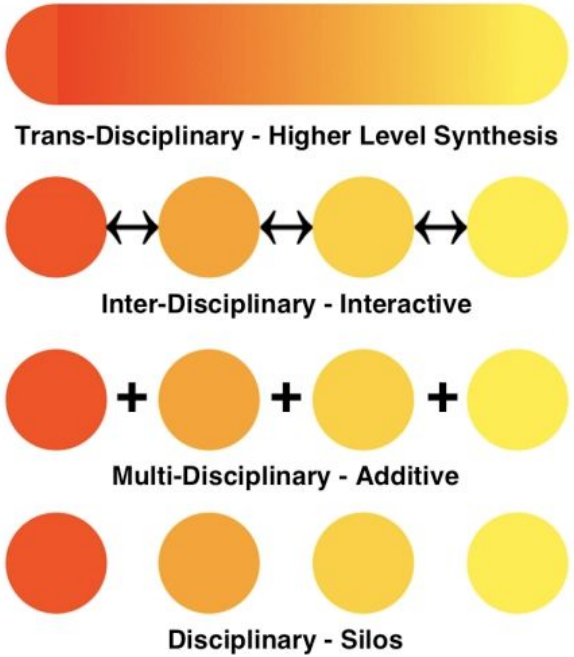
Remember, Wicked Problems cannot be solved by a single discipline so...

Transdisciplinary courses

A reflexive approach that addresses societal problems by means of interdisciplinary collaboration as well as the collaboration between researchers and extra-scientific actors; its aim is to enable mutual learning processes between science and society; integration is the main cognitive challenge of the process.



(Jahn, Bergmann, Keil, 2012)

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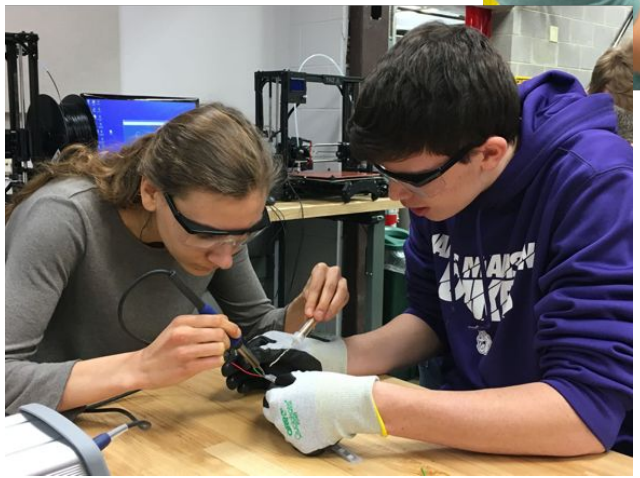
JMU XLabs Transdisciplinary Courses

- Augmented & Virtual Reality
- Autonomous Vehicles
- Blockchain
- Community Innovations
- Creativity and Innovation
- Drones
- Fueled
- Hacking 4 Defense
- Hacking 4 Diplomacy
- Internet of Things
- Medical Innovations
- Robotic Process Automation



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Chat question

What mix of disciplines might be needed to address the wicked problem you thought of earlier?

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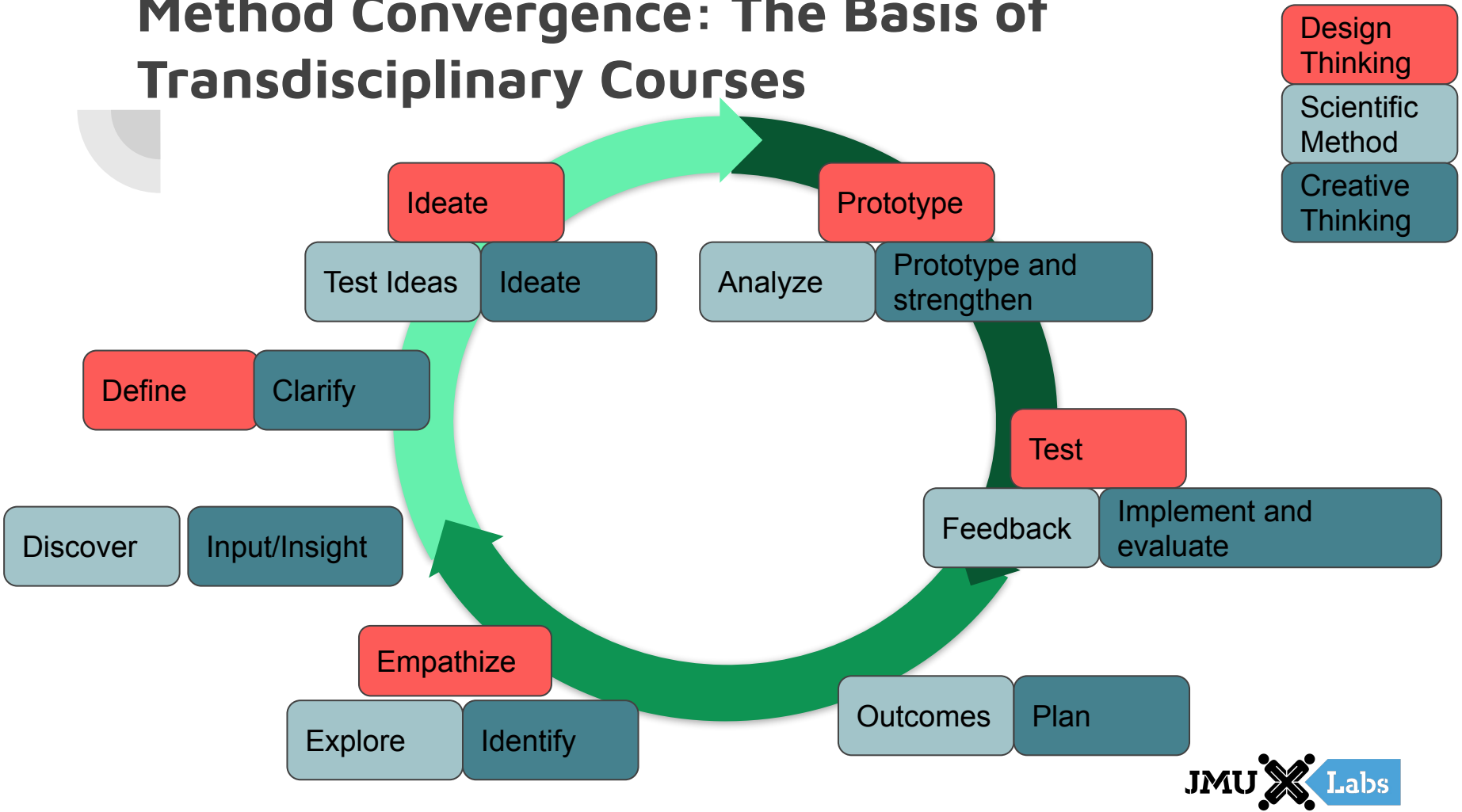
Method Convergence: The Basis of Transdisciplinary Courses



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Key enablers for transdisciplinary courses: I

A disciplinary agnostic space for co-teaching

Borrowing teaching philosophies, frameworks, and methods from multiple disciplines including design thinking

The ability to mix these into new approaches and strategies: For example: science practice incorporating participatory design

Ability to parse wicked problems into digestible pieces that students can tackle successfully.

Supportive ”home” disciplinary administration and structure (Unit Heads, Deans)

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Key enablers for transdisciplinary courses: II

Employ “Lean Startup” as a research method:

- Identify a value proposition
- Identify beneficiaries

Students take ownership of their learning

Faculty model the strengths/contributions of their disciplines

Use qualitative and quantitative research methods

Test for feasibility, desirability, viability

Chat question

Considering your campus and the key enablers we've identified, which enablers need activating at your institution?

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Implementation: Combining design thinking, lean startup, and wicked problems to create change

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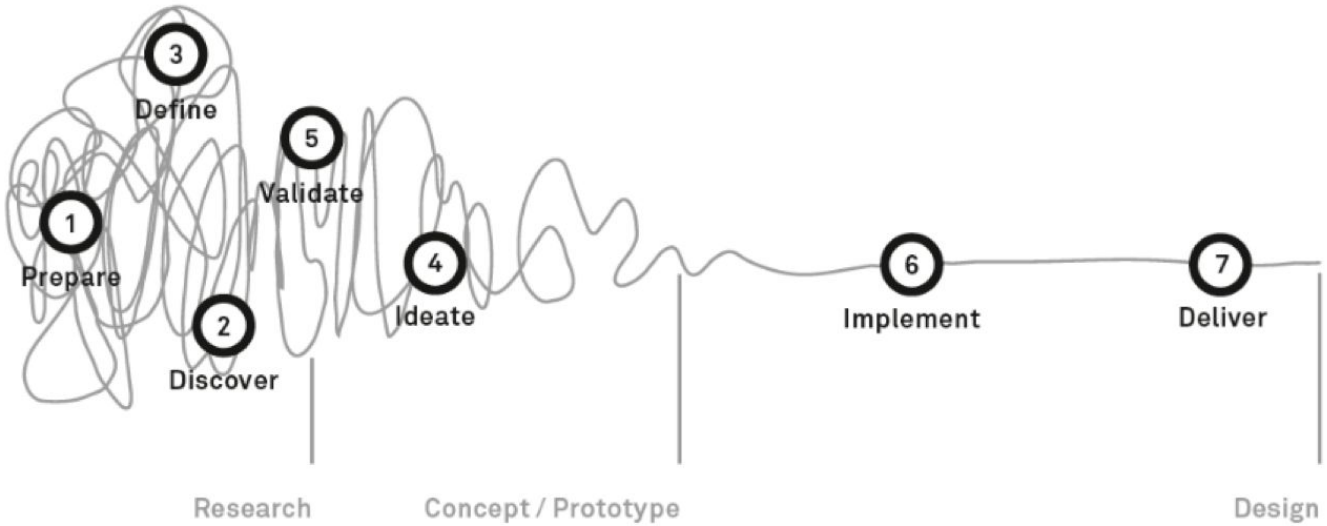
How do we structure classes with wicked problems…. for undergraduates?

Intro to ambiguity



from *Intersection* by Milan Guenther, www.intersectionbook.com
based on a model by Damien Newman

Backward Design to create classes.

Shared objectives for ALL students in the course (usually one from every disciplines)

Structured on Kolb Learning cycle.

Still, ambiguity is an ever-present part of the classes.

Using design thinking at a class level to develop the knowledge and skills with students

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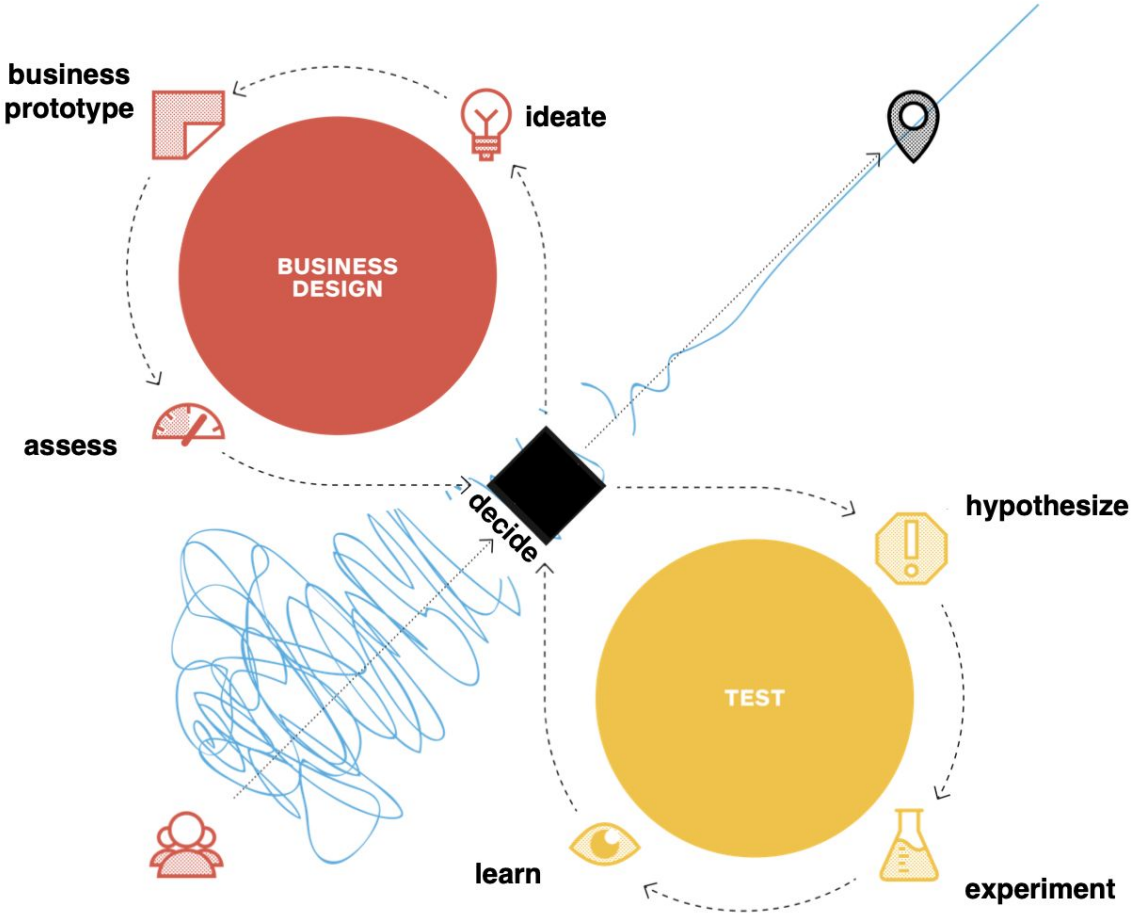
business
prototype
ideate
BUSINESS
DESIGN
assess
decide
hypothesize
TEST
learn
experiment

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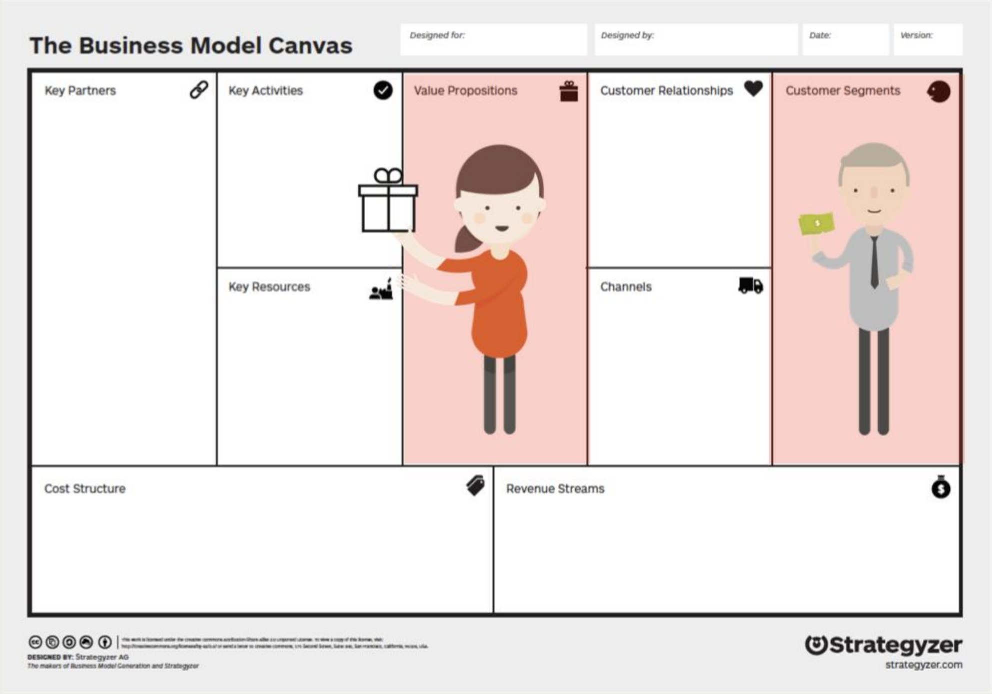
Students learn about the concept of empathy



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The Value Proposition Canvas

Strategyzer
strategyzer.com

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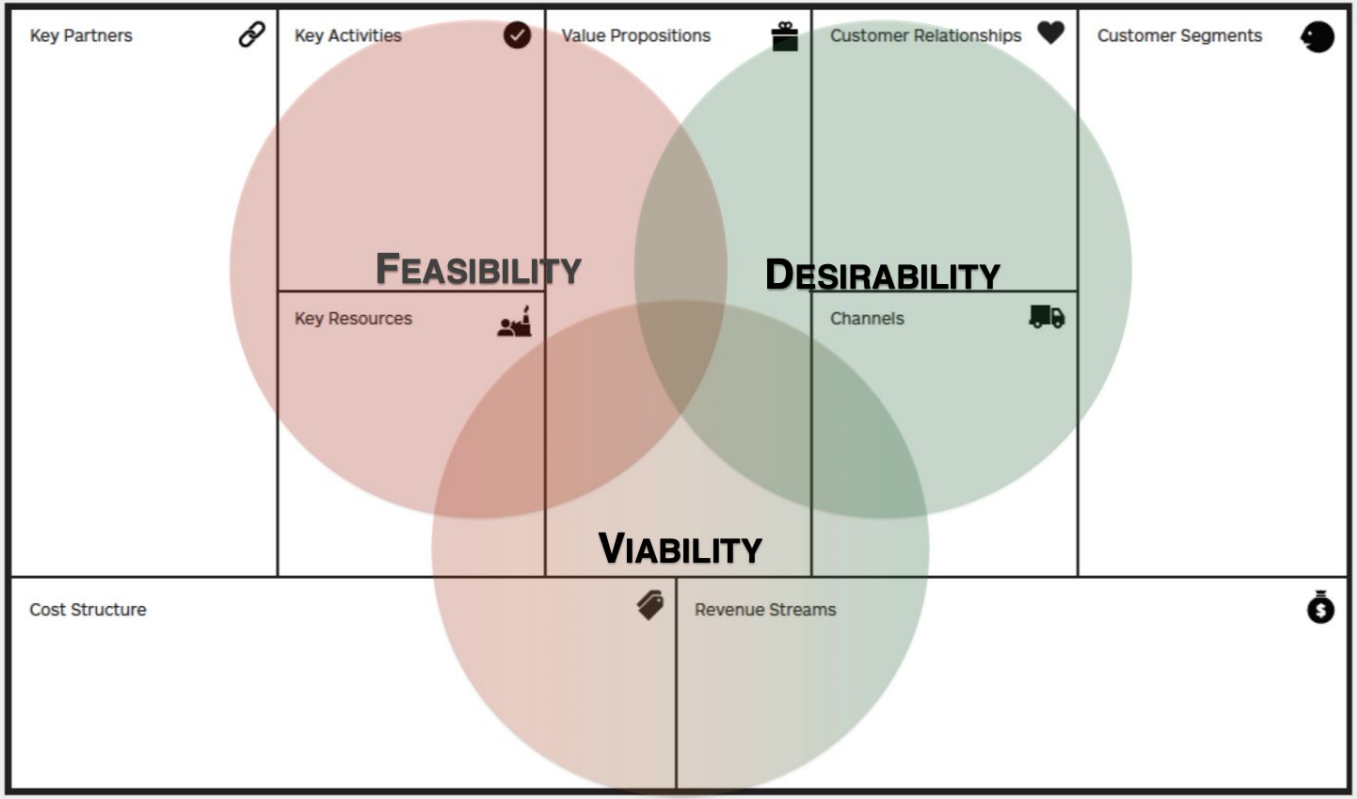
The Business Model Canvas

Designed for:	Designed by:	Date:	Version:



DESIGNED BY: Strategyzer AG
The makers of Business Model Generation and Strategyzer

Strategyzer
strategyzer.com

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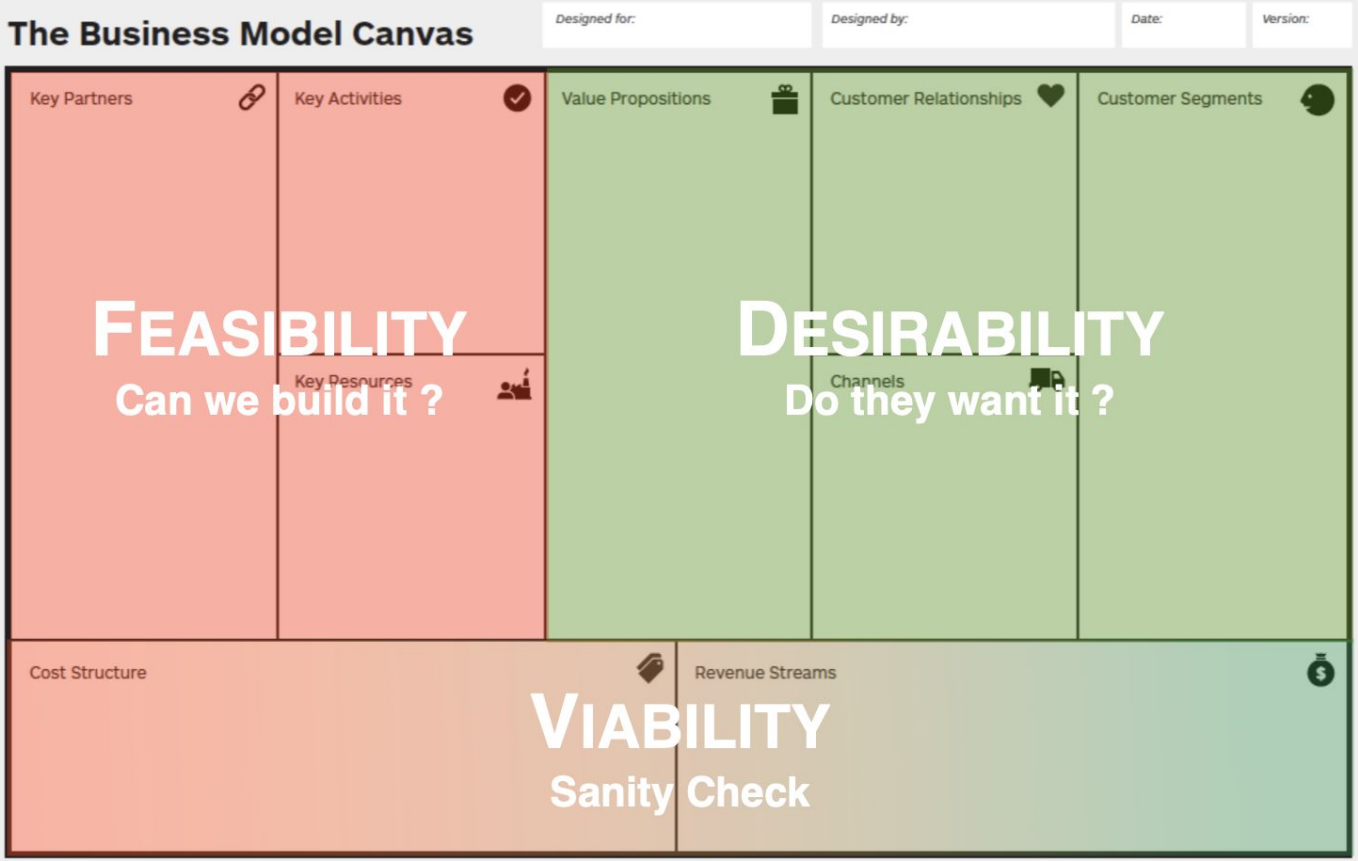
The Business Model Canvas
Designed for:
Designed by:
Date:
Version:
Key Partners
Key Activities
Value Propositions
Customer Relationships
Customer Segments
FEASIBILITY
Can we build it ?
Key Resources
DESIRABILITY
Do they want it ?
Channels
Cost Structure
Revenue Streams
VIABILITY
Sanity Check
DESIGNED BY: Strategyzer AG
The makers of Business Model Generation and Strategyzer
ADAPTABILITY
Strategyzer
strategyzer.com

Assessment: What are we assessing and how do we know students are learning?

Chat question

What response variables or metrics would you need to be convinced of the success of these transdisciplinary experiences?

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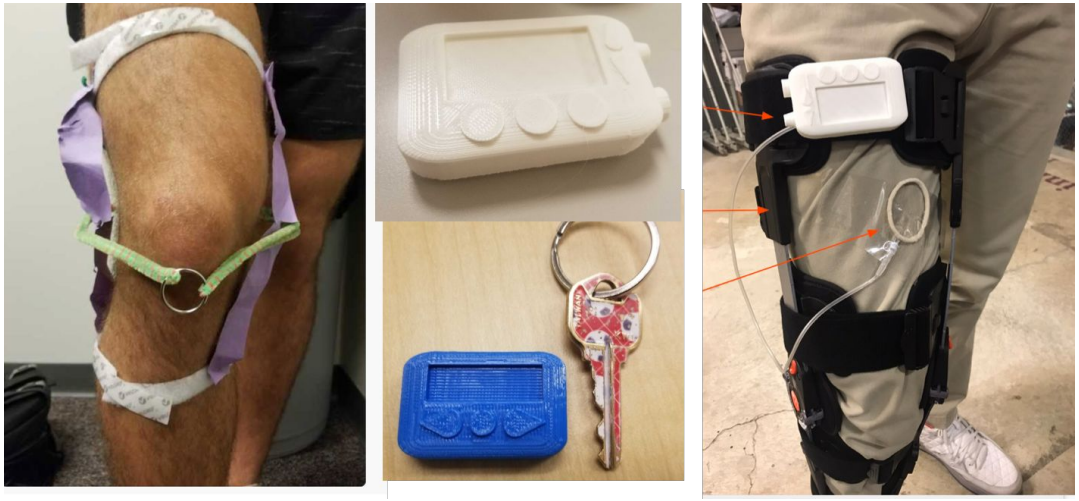
Product vs Prototype



Process over Product: Prototype

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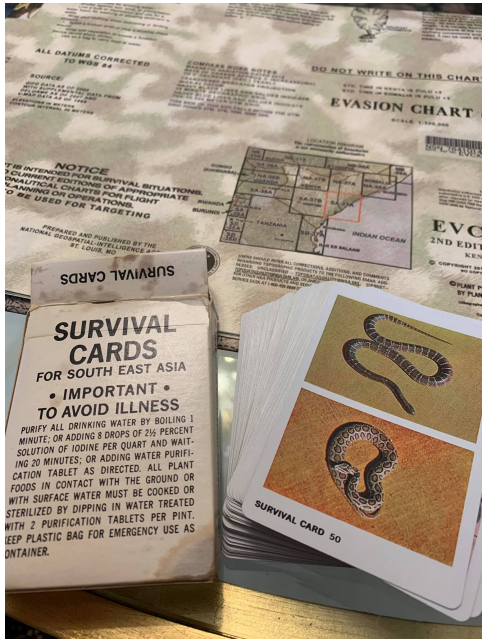
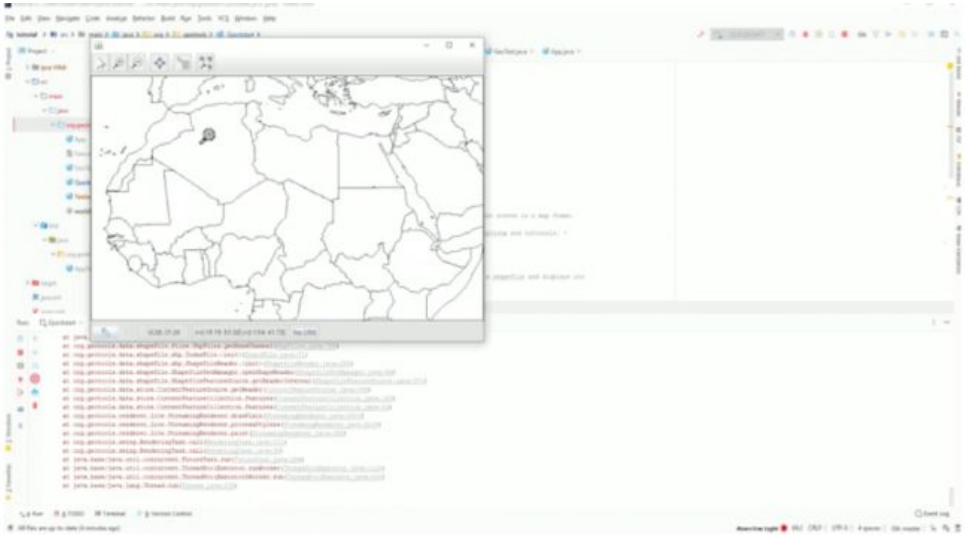
Product development (MVP)

Problem given by Joint Personnel Recovery Agency

Hacking for Diplomacy class





Existing toolkit for US military

MVP by JMU Team (Fall 2019)

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Student Learning: How do we fairly grades to students working in transdisciplinary teams?

The Learning Record: Portfolio-Based Reflective Writing

THE LEARNING RECORD

A REFERENCE GUIDE FOR DRONES, JMU X-LABS, SPRING '19

OVERVIEW

The Learning Record (LR) is a portfolio that you will build over the course of the semester and that we will use to evaluate 70% of your final grade. The other 30% of your grade will be determined by the quality of your final project. We will provide a lot of support throughout the semester about how to complete the LR, but you should always have this document at hand for easy reference.

BACKGROUND: WHAT IS THE LEARNING RECORD?

In traditional college courses, assessment is often product-based, in that you receive grades based on the quality of projects, papers, and exams. In the JMU X-Labs, *the process* of what and how you learn is as important as the final deliverable. After all, we often ask you to solve problems and design products and services that are extremely complex and that may not even even exist. Also, you are undertaking this work in teams with people from different disciplines, often using cutting-edge technologies. You're also getting valuable experience working for clients and with experts from beyond the university. Your career—and the world at large—will greatly benefit from these experiences and skills. *How* you learn is as important as *what* you produce.

That's why we are using the LR to assess your work in this course. Simply, the LR is a portfolio-style assessment system. It helps you to gather, organize, analyze, evaluate, and report on your progress and achievement throughout the semester. Beyond documenting what you've done and securing your grade, the LR will be your personal archive of your work during this course. You'll be able to refer back to it when you apply for jobs, look for contacts you made during the course, and when you want to refresh your memory regarding the research you undertook and the knowledge you produced with, and for, your collaborators.

1

Students write learning observations

ALL instructors make comments

Looking for evidence of learning toward:

Course objectives and

6 Dimensions of Learning:

- Confidence and independence
- Skills and Strategies
- Knowledge and Understanding
- Use of prior and emerging experience
- Reflection
- Creativity, Originality, Imagination

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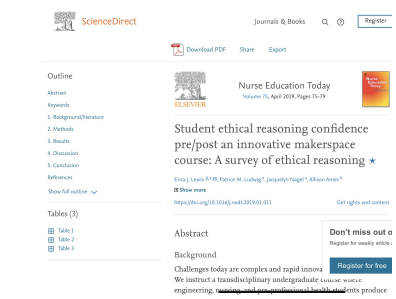
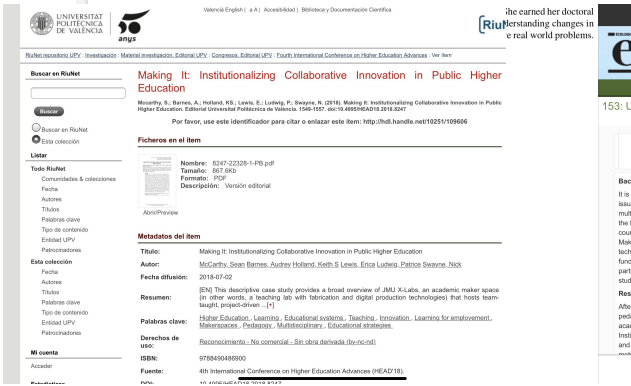
Programmatic and Research





Indirect Indicators:
- Hiring trends
- Pay scales
- Interviewing skills
- Value proposition

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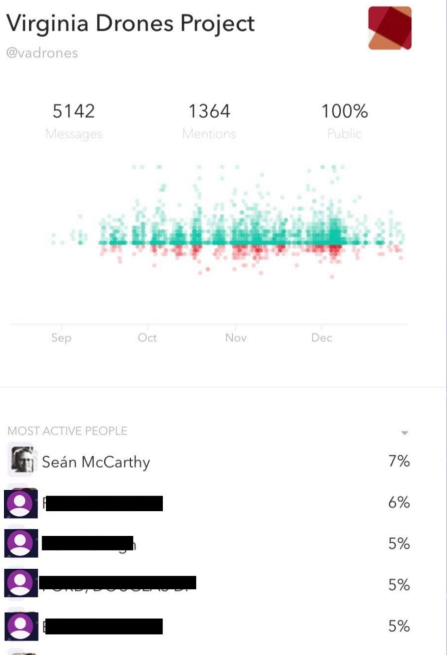
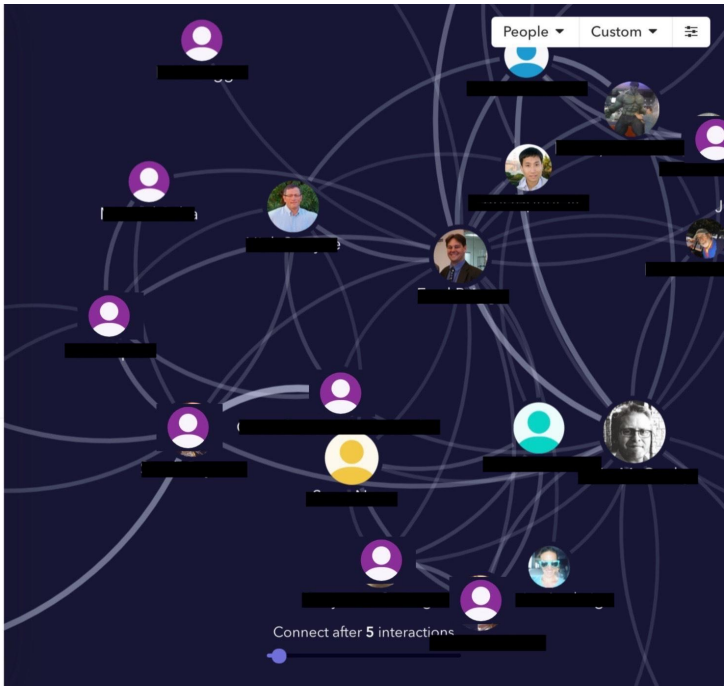
Quantitative Assessment of JMU XLabs classes



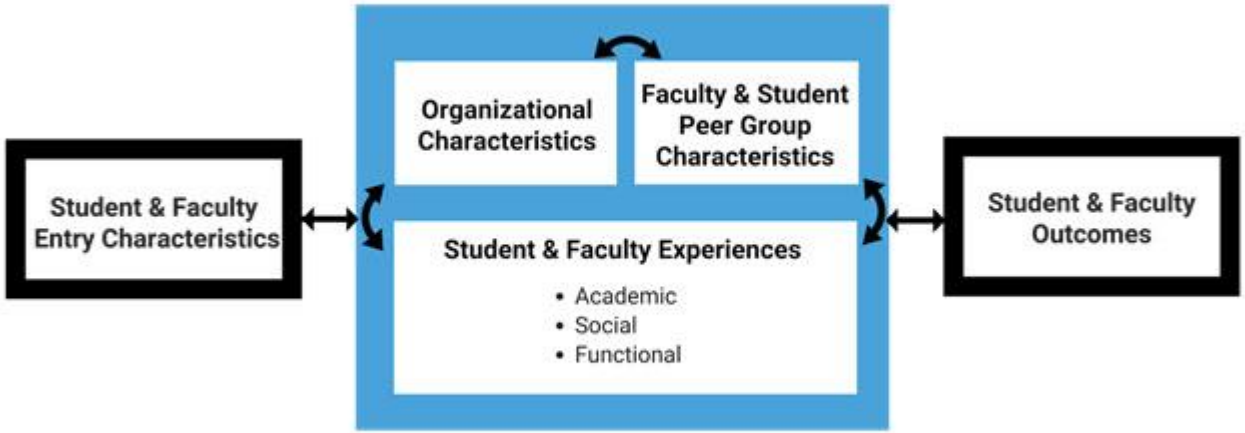


Submitted proposal to NSF IUSE Engaged Student Learning Phase 1 to test Social Network Analysis as a performance metric.

AAC&U VALUE RUBRICS

Driving Change

How does this method create change?



Adapted from (Berger & Milem, 2000)

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The Magic of Multiple Disciplines

More creative solutions emerge from teams form from non-adjacent disciplines.

- Students feel empowered to ask questions outside their disciplinary are (they aren't expected to know)
- Students are expected to teach their peers - teaching produces deeper learning
- Teams are unbound by disciplinary norms

(Gallant & Getz, 2009; Gibbons et al., 1994; Klein et al., 2001; Rossini et al., 1984

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New knowledge, networks, & passion

The impact of ownership

Attitudes and opportunities: Student vs. Faculty (autonomous vehicle)

Disciplines and traditions: Expanding opportunities through demonstrated competencies

I'm awestruck just thinking about my upcoming position as a software engineer at Booz Allen Hamilton. It's completely outside of anything I've ever taken on before—and I'm ready. I wouldn't be where I am today without JMU or the Hacking for Diplomacy class. Go Dukes!

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New knowledge, networks, & passion

"I started work this week at Politico and more times than I can count they've brought up the importance of innovation and I've been able to capitalize on Hacking for Diplomacy, again. What was the most stressful, difficult thing at the time has paid off tenfold!

Cole Thomas ('19), Political Science, 7/11/2019

"You don't think as an undergrad you'll be given such an opportunity [to work on a product for an international organization], but we were—thanks to Hacking for Diplomacy and JMU X-Labs.

Anna Uitvlucht ('19), International Affairs

"This is the first class where I felt like I was pushing myself to my limits and making an impact on an important organization.

Danielle Kratowicz, Accounting

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Value for faculty

•Wicked problems attract faculty who:

- Wish to work on a problem out of Intellectual curiosity
- are already working on these problems but seek interdisciplinary inputs
- Want to seed research potential research trajectories
- Bridge academic inquiry with real-world impacts
- Seek experiences outside of regular research and teaching activity to enhance professional portfolios

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Value for students

Ongoing challenges

- Institutionalization vs. innovation
- Faculty credit
- Organizational support outside of the standard departmental structure
- Time/resources/technology for collaboration
- Time/resources for problem curation
- Integrating teaching and research
- Measuring outcomes
- Link development: external relations, innovation, alumni relations, industry & legislative liaison

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The future

How might we scale up 10x ?

How do we creatively combine institutionalization with the disruptive characteristics necessary for innovative programming?

Responses: Designing curriculum for faculty; designing student and programmatic assessment models; sustainability beyond the end of the semester.

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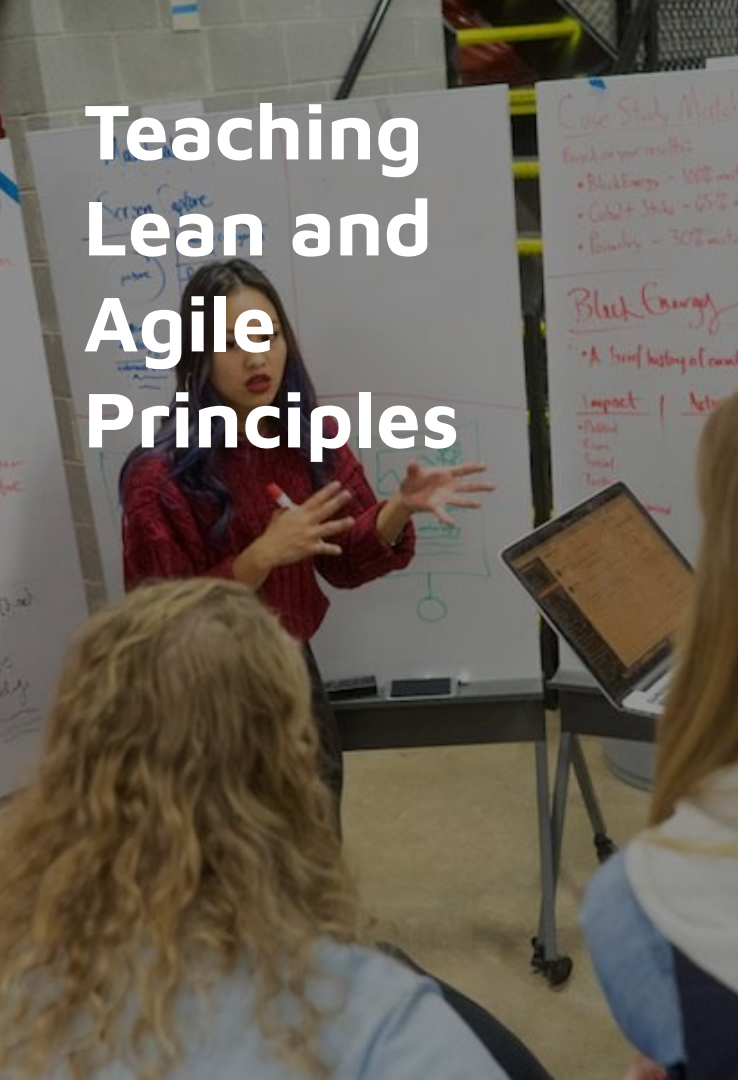
Questions and Disucssion



Teaching Lean and Agile Principles

Lean Principles

- Eliminate Waste
- Emphasize Quality
- Create Knowledge
- Defer Commitment
- Deliver Fast
- Respect People
- Optimize the Whole

Agile Principles

- **Individuals and interactions** over processes and tools
- **Results** over comprehensive documentation
- **Collaboration** with customer over contract negotiation
- **Responsiveness** to change over following a plan

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Poll:

Which seems like the most difficult area of the Innovation Funnel to address at your Institution?

1. Source
2. Curate
3. Discover
4. Incubate
5. Transition

Two levels of Assessment: Within Classes and "Programmatic"

Class/Course

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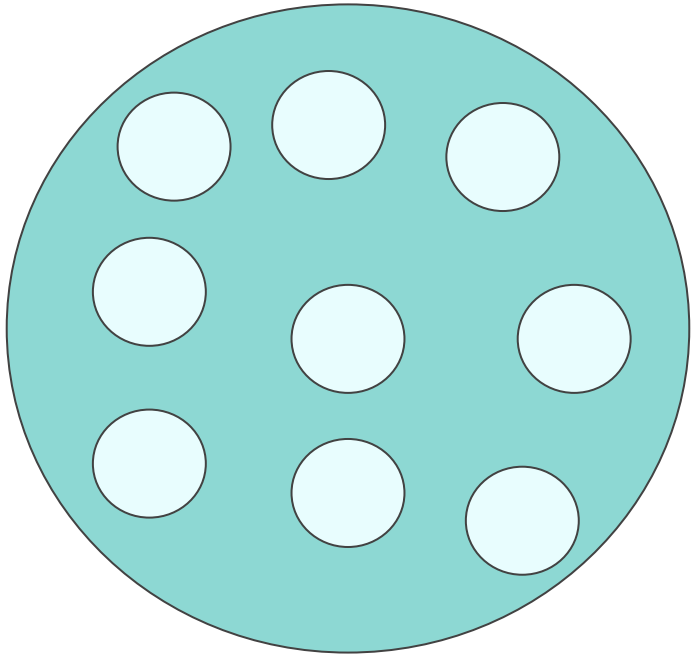

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