

# Platform Technology Assessment & Commercialization Planning

ERC ILO Meeting  
October 24, 2024



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Note: Platform Technology Assessment videos can be accessed at

<https://www.youtube.com/watch?v=GYqugaIN1ZI&list=PLE97u-3IRxE2qKSLKY0dkYA-KZ8zYDh7o>

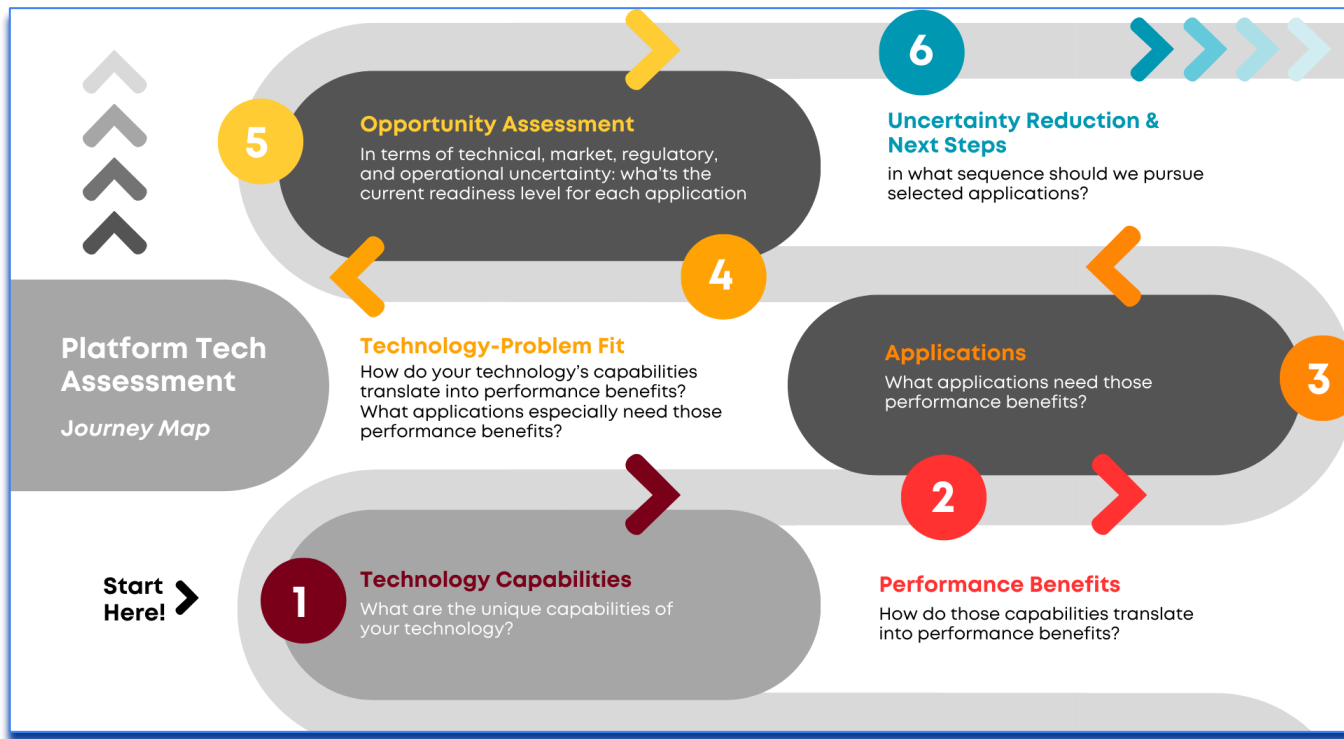
# The problem: Where to start; then what?



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For innovators who have developed **early-stage technologies** with **multiple applications**, and need to determine an **initial market** and **developmental roadmap** to achieve their vision.



# Use Cases

## “Explorer” Researchers

- Many ideas - don't know where to start
- Have problems articulating distinctive value of tech
- Vision for the “moonshot” but not intermediate applications
- Interested in NSF national I-Corps Teams <sup>TM</sup> but uncertain which customers to focus on
- Motivated for commercialization

## Research Centers

- NSF ERCs, NSF IUCRCs, large research labs, etc.
- Center PIs concerned about commercialization metrics
  - Annual funding agency reporting
- Individual researchers more focused on problem-solving than invention disclosures
- Innovations could be more visible to tech transfer and industry partners



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# Program Experience

## Five Modules

### Foundational Concepts

Platform Technology *Definition*  
Pasteur's Quadrant *Framework*  
Technology Readiness Level *Framework*  
Lily Pads *Framework*

### Technology Capabilities

Technology Capabilities *Framework & Activity*

### Technology-Problem Fit

Jobs to be Done *Framework*  
Technology-Problem Fit *Framework & Activities*

### Opportunity Assessment

Types of Uncertainty *Framework*  
Opportunity Readiness Level Assessment *Activity*

### Uncertainty Reduction & Next Steps

Application Roadmap (Lily Pads) *Framework & Activity*  
Uncertainty Reduction Strategies *Framework & Activity*



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## Strategic Planning Format

### Cross-Functional Teams are Ideal

Principal investigator  
Grad students and postdocs  
Tech transfer/commercialization staff  
Industry advisor, if feasible

### Hands-on Sessions

Limited homework (watch videos)  
Breakout groups (by innovation) immediately apply frameworks  
Collaborate using Google Docs

### Facilitated, Not Taught

Lots of discussion and sharing  
No formal presentations by participants

### Flexible Format

Remote or in-person  
1, 2, or 5 sessions (planning retreat or multi-session course)

### Turnkey Canvas Site

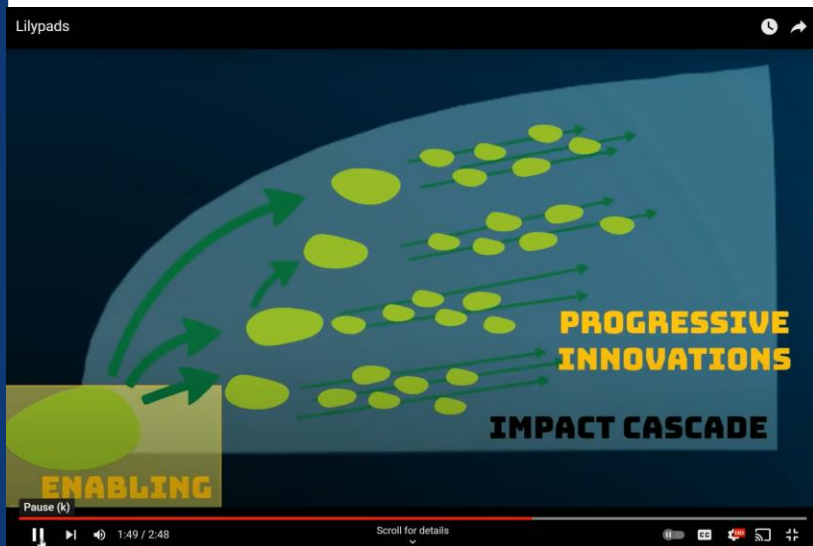
Lecture videos: frameworks + ongoing X-ray example  
"Assignments" for in-session Google Doc collaborations  
Consolidated PowerPoints  
Instructor Guide



# Module 1: Foundational Concepts

Platform Tech, Use-Inspired Research, Tech Readiness Level, Lily Pads

Introduce Case Example (Used for All In-Session Activities to Apply Frameworks)



# Module 2: Technology Capabilities

## Framework Introduction

## Breakout Group Application



| Unique capabilities  | Performance benefit(s)  | Conditions where it performs well                                     | Conditions where it performs poorly   | Confidence level (1=low; 5=high) |
|--|---|---|---|----------------------------------|
| Ultrarapid cooling (~1 million C/min)  | 1. Higher rates of vitrification<br>2. Use of lower molarity cryoprotectants<br>3. Prevent ice crystal formation / tissue and cellular damage | Smaller biosystems, single cells                                      | Large biosystem (> 1mm)   | 4                                |
| Scaling up in size of biosystem (use for large number of cells compared to other alternatives) | Better survival for a given biosystem size  | Moderate size systems (few 100 microns), possible parallel processing | scales with surface area and not volume, but physically challenging as size becomes large in 2D format (few inches in size is when it works well) | 4                                |
| Scaling up in number of cells/etc. preserved simultaneously                                    | obviate DNA damage? (beats droplet vitrification)   | low tech environments/ use in field                                   | constraints on permeability to CPAs   | 5                                |
| Handle cells easily  | provides an ability to transfer heat and chemicals from the cells   | few cells   | large pore size mesh  | 2                                |

# Module 3: Technology-Problem Fit

## Framework Introduction

## Breakout Group Application

**Technology-problem fit leads to product-market fit.**

**Technology-Problem Fit**

**Solution Validation**

**Product-Market Fit**

### Technical Capability 1: Rapid cooling

| Potential Applications | Customer Job to be Done   | Current Solution  | Problem Hypothesis  | Current Pain | Value Hypothesis   | Potential Gain |
|------------------------|---|---|---|--------------|--|----------------|
| Islets transplantation | Vitrify pancreatic islets (i.e. cool them to cryogenic temperature without crystalline ice formation) | None clinically usable  | Existing protocols lead to low throughput, low viability,                                   | High         | More cell types<br>better cell viability<br>easy to use<br>easier process<br>Uniform islets sample preparation | High           |
| Biobank coral larvae   | Vitrify coral larvae at conservation relevant scale   | For research, droplet vitrification and laser warming. Commercially, none exists. | Current solution is non-portable, expensive, and low throughput and is not feasible for use | High         | Scaling to numbers of species, genotypes, etc. that are relevant for large-scale biodiversity preservation     | High           |
| Shrimp supply chain    | Inoculate the aquaculture ponds whenever needed   | Multiple solutions exist  | Current solutions are less efficient  | Medium       | Improving food yield optimization and use of facilities (e.g. aquaculture ponds) through cryopreservation      | Medium         |

Key hypotheses to test further: Applicability, modifications to mesh size and geometry affecting the cooling rates



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# Module 4: Opportunity Readiness

## Framework Introduction



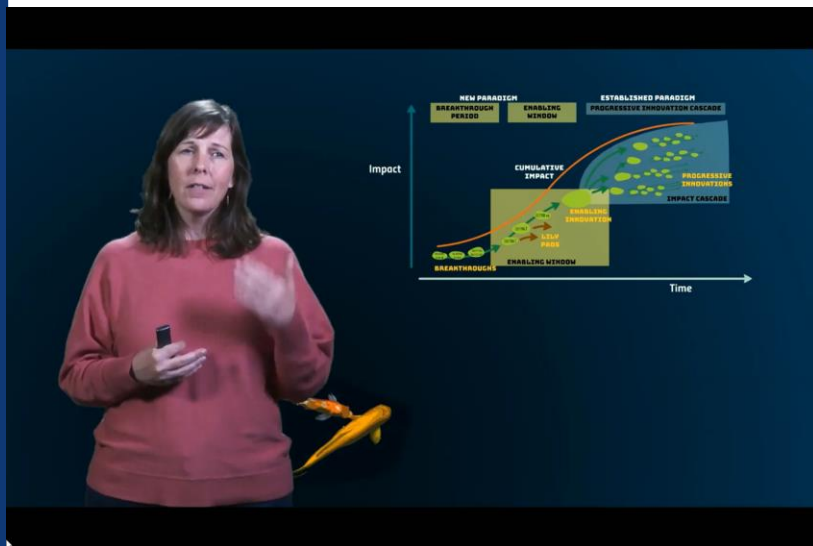
## Breakout Group Application

|                         |                                     |  |
|-------------------------|-------------------------------------|--|
| Technical Uncertainty   | 1 - Low<br>2 - Moderate<br>3 - High | How soon do you expect your technology be developed to deliver differentiated performance benefits?<br>Low = < 2 years<br>High = > 5 years   |
| Market Uncertainty      | 1 - Low<br>2 - Moderate<br>3 - High | Is there a set of customers who need a better solution and are ready and willing to adopt one?<br>Low = clearly defined set of customers with articulated need<br>High = ill defined market with little or no awareness of need                  |
| Regulatory Uncertainty  | 1 - Low<br>2 - Moderate<br>3 - High | Is there an existing or attainable pathway for any required regulatory approvals?<br>Low = existing pathway with predictable outcome<br>High = unknown or nonexistent pathway or unpredictable outcome   |
| Operational Uncertainty | 1 - Low<br>2 - Moderate<br>3 - High | Can your solution be manufactured/produced/delivered at sufficient scale and cost to satisfy customer demand?<br>Low = Existing processes and technology can be used or adapted<br>High = Complex new processes and technology must be developed |

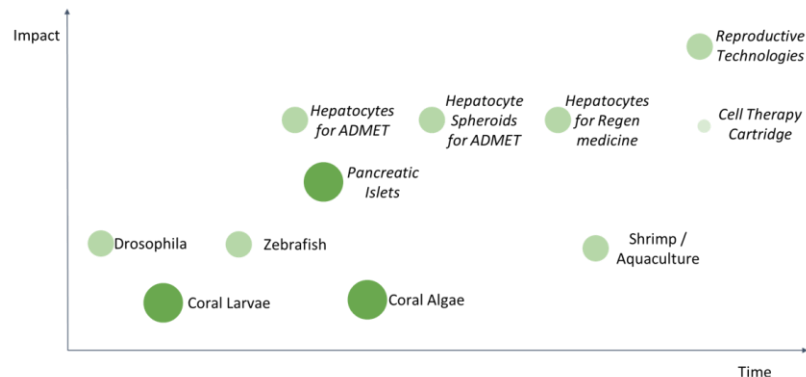
| Application Opportunity | Technical Uncertainty | Market Uncertainty | Regulatory Uncertainty | Operational Uncertainty | Total Score | Unknowns to Research Further   |
|-------------------------|-----------------------|--------------------|------------------------|-------------------------|-------------|--|
| Coral larvae            | 2                     | 3                  | 1                      | 2                       | 8           | TU: Different species respond differently,<br>MU: who will pay, is there a customer,<br>OU: meaningful proof of concept of large scale-up does not exist<br>RU: inadvertently modifying genetics of population, but fewer issues if within a country |
| Hepatocytes for ADMET   | 1                     | 2                  | 1                      | 3                       | 7           | TU: not much technical risk<br>MU: getting customers to change over<br>RU: not placed in body so lower regulatory risk<br>OU: some operational concerns, but relatively low  |
| Shrimp preservation     | 3                     | 3                  | 2                      | 3                       | 11          | TU: different techs needed for different lifecycle stages and limited success to date<br>MU: replacing standard shrimp and impact on existing market<br>RU: uncertainty replacing natural food<br>OU: many challenges                                |

# Module 5: Uncertainty Reduction/Next Steps

## Framework Introductions



## Breakout Group Application



|   | 3-6 Months   | 6-18 Months   | 18-36 Months                            |
|---|--|---|---|
| Application 1: Coral larvae - 8                     |  |   |   |
| Market - 3<br>Is it desirable to users / customers? | - market analysis - philanthropy, people who are already maintaining cryobanks - conservation managers | - Talk to the relevant stakeholders with high interest in cryopreservation    |   |
| Technology - 2<br>Is it technically feasible?       | Feasibility study for scale-up   | - Feasibility, broader applicability<br>- test new CPAs that are less harmful | - Collect user feedback, iterate design |
| Operational - 2<br>Can you produce it at scale?     | - add storage system prototype (to demonstrate we can store 100s of meshes)                            | - Figure out the cold chain needed for operations                             | - Ready to package and go to the market |
| Regulatory - 1<br>Is there a regulatory pathway?    | - Ask the coral people to understand inter-country regulations   | - consult with legal experts, regulatory bodies, USDA                         |   |

# “Most valuable insights”

How to conceptualize technology capabilities outside of the initial development.

Lily Pad Strategy

That I am not the only person struggling with this and nature of my problem and the way I should approach to solve it.

The worksheets and examples for the teams.  
Breakout rooms!

This is a great course. Thinking this way is so out of the norm for most researchers developing technology, the earlier these ideas and vocabulary can be introduced the better. I also think teams work the best. These projects don't exist in a vacuum and it's helpful to have other perspectives.



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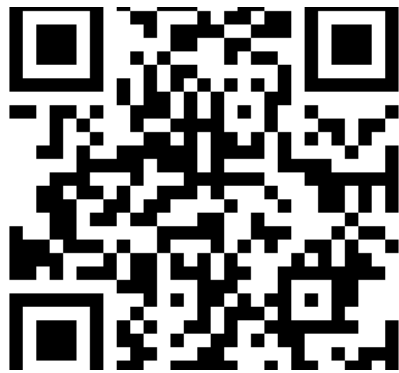
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# Upcoming Platform Tech Assessment Workshops from Great Lakes I-Corps Hub

Each workshop is two half-days 9-noon central/10-1 eastern

- Nov 12/19
- Offered each quarter
- Free (NSF funded)
- Online



<https://www.greatlakesicorps.org/programs/platform-technology-assessment-workshop/>

***You can import the Canvas site to your institution's LMS and conduct the program yourself!***

# Commercialization Planning for Early-Win Technologies

## Working Name

Proposed Startup Name or Licensable Technology  
Name (1-2 words)

## Tagline

One sentence – illustrative of value proposition,  
compelling & understandable to nonspecialists

## Value Proposition

One paragraph: What is the problem, how are you  
solving it, what makes your solution special (i.e.  
benefits not features). Beachhead and future markets.

## Products/Services

One sentence description – what are customers buying.  
Then add high-level laundry lists.

## Markets/Fields of Use

Short-medium-long term  
Technology readiness level  
Market readiness level

## Market Size

TAM/SAM/Target/Beachhead  
Current, Five-Year, CAGR

## IP Status

Disclosures  
Provisional, pending, awarded patents  
Know-how, trade secrets

## Team

Researchers  
Business

## Enabling Technology, Market & Regulatory Trends

Pick up from industry reports available an any R1 school's  
business library

## Industry Landscape

*Major players:* Pick up from industry reports  
*Current/potential R&D partners:* Pick up from industry reports

## R&D Funding Requirements & Potential Nondilutive Sources (Beachhead Markets)

SBIR/STTR, gap funds, state economic development,  
philanthropy, corporate-sponsored research or partnerships

## Product Roadmap

For each product: development and market milestones

## Commercialization Plan Template

**Working Name:** Proposed Startup Name or Licensable Technology Name (1-2 words)

**Tagline:** One sentence – illustrative of value proposition, compelling & understandable to nonspecialists

### Value Proposition:

One paragraph: What is the problem, how are you solving it, what makes your solution special (i.e. benefits not features). Beachhead and future markets.

### Products/Services:

One sentence description – what are customers buying. Then add high-level laundry lists:

|                                   |                  |
|-----------------------------------|------------------|
| <b>Physical product elements:</b> | <b>Services:</b> |
| •                                 | •                |

### Markets/Fields of Use:

| Timeframe   | Market/Field of Use  | Technology Readiness Level <sup>1</sup>                                | Market Readiness Level <sup>2</sup>                                    |
|-------------|--|--|--|
| Short term  | <b>Market A</b> <ul style="list-style-type: none"> <li>Specific uses cases or applications</li> </ul>  | <ul style="list-style-type: none"> <li>TRL ?</li> <li>TRL ?</li> </ul> | <ul style="list-style-type: none"> <li>MRL ?</li> <li>MRL ?</li> </ul> |
| Medium Term | <b>Market B (there may be more than just one in this time frame)</b> <ul style="list-style-type: none"> <li>Specific uses cases or applications</li> </ul> | <ul style="list-style-type: none"> <li>TRL ?</li> <li>TRL ?</li> </ul> | <ul style="list-style-type: none"> <li>MRL ?</li> <li>MRL ?</li> </ul> |
| Long Term   | <b>Market C (there may be more than just one in this time frame)</b> <ul style="list-style-type: none"> <li>Specific uses cases or applications</li> </ul> | <ul style="list-style-type: none"> <li>TRL ?</li> <li>TRL ?</li> </ul> | <ul style="list-style-type: none"> <li>MRL ?</li> <li>MRL ?</li> </ul> |

### Market Size:

|           | Current Year | Five (Ten?) Years | CAGR |
|-----------|--------------|-------------------|------|
| TAM       | \$? B        | \$? B             | ??%  |
| SAM       | \$? B        | \$? B             | ??%  |
| Target    | \$? B        | \$? B             | ??%  |
| Beachhead | ≈\$?B        | ≈\$?B             | ≈??% |

### Intellectual Property Status:

- Provisionals filed
- Patents awarded
- Know-how/trade secrets

<sup>1</sup> TRL: 1-Basic principles observed 2-Tech concept formulated 3-Experimental proof of concept 4-Tech validated in lab 5-Tech validated in relevant environment 6-Tech demonstrated in relevant environment 7-Prototype in operational environment 8-System complete and qualified 9-System proven in operational environment

<sup>2</sup> MRL: 0-Perceived Need 1-Notional Value Proposition 2-Notional Customer Characterization 3-Customer Discovery 4-Low-Fi MVP Design 5-Low-Fi MVP Campaign 6-Revalidate Solution and Model 7-High Fidelity MVP Campaign 8-Validate Model With MVP Results 9-Go To Market Decision

### Team:

|   |   |
|---|---|
| <b>Researchers:</b> <ul style="list-style-type: none"> <li>Faculty and Researchers:</li> <li>PhD students/candidates and postdoc(s):</li> </ul> | <b>Business:</b> <ul style="list-style-type: none"> <li>If a startup, who will lead the business?</li> <li>Who else will be involved</li> </ul> |
|---|---|

### Enabling Technology, Market & Regulatory Trends

Pick up from industry reports available an any R1 school's business library

### Industry Landscape:

**Major players:** Pick up from industry reports

**Current/potential R&D partners:** Pick up from industry reports

### R&D Funding Requirements & Potential Nondilutive Sources (Beachhead Markets):

(Include SBIR/STTR, other federal commercialization possible funding, gap funds, state economic development, philanthropy, corporate-sponsored research or partnerships)

| R&D Project  | Required Funding (Estimate)   | Potential Funding Sources  | Potential Funding \$\$   |
|--|---|--|--|
| <ul style="list-style-type: none"> <li>Commercialization Project A</li> <li>Commercialization Project B</li> <li>Etc.</li> </ul> | <ul style="list-style-type: none"> <li>\$?</li> <li>\$?</li> <li>\$?</li> </ul> | <ul style="list-style-type: none"> <li>Source A</li> <li>Source B</li> <li>Etc.</li> <li>Source C</li> <li>Etc.</li> <li>Source D</li> <li>Etc.</li> </ul> | <ul style="list-style-type: none"> <li>\$? million</li> <li>\$? million</li> <li>\$? million</li> <li>\$? million</li> <li>\$? million</li> <li>\$? million</li> </ul> |

### Product Roadmap:

|                     | Year 1                                    | Year 2                                    | Year 3                                    |
|---------------------|---|---|---|
| Beachhead Product A | Development/regulatory milestones/launch? | Development/regulatory milestones/launch? | Development/regulatory milestones/launch? |
| Beachhead Product B | Development/regulatory milestones/launch? | Development/regulatory milestones/launch? | Development/regulatory milestones/launch? |
| Etc.                |   |   |   |

### Appendix

Beginning on a separate page, add notes and additional details regarding each of the above sections. The above commercialization plan summary should be no more than 2 pages.