

Today

# How to Engage with Research at CMU: Capstone Projects

# ENABLE

A CMU Retail & Services Collaborative

Today's talk will be recorded and on the record.

Please submit questions for the speaker via the Q&A icon at the bottom of your main Zoom screen.

## Featured Speakers



**Alan Montgomery**  
Professor of Marketing &  
Head, MSBA Program  
Tepper School of Business



**Brad Eiben**  
Executive Director  
MSPM Program  
Tepper School of Business



**Skip Shelly**  
Assoc. Teaching Professor &  
Director of the MHCI program,  
School of Computer Science



**Jessica Vogt**  
Engagement Manager  
Master of Human-Computer  
Interaction (MHCI)  
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**Andrew Li**  
Assistant Professor of  
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Tepper School of Business

For more information about ENABLE, please write to [enable@cmu.edu](mailto:enable@cmu.edu) or visit [cmu.edu/enable](http://cmu.edu/enable)

# What are Capstones?

## Capstone projects

- bring teams of highly-trained **students**...
- to focus on **sponsor-defined** projects...
- that result in exploration of solutions...
- and potentially a proof-of-concept or prototype.

# What are Capstones?

## Quick facts:

- Team: 2–5 students and faculty advisor(s)
- Duration: 4 –12 months
- Starting date: varies across programs
- Price: \$10,000–\$85,000

# The Many Options at CMU

Focusing on those of interest to the EN*A*IBLE community:

- At least 18 options across CMU (more details available after today)
- An (incomplete) sample of topics:
  - **Business Analytics**, Data Science, Machine Learning, AI
  - **Product Management**, Strategy, Innovation, UX, Market Exploration
  - **Human-Computer Interaction**

# Identifying the “Right” Project

- Expectations from the company
  - Well-defined problem statement
  - Dedicated sponsor contact
  - Access to required data
- Deliverables of successful projects
  - Exploration and evaluation of a diverse set of solutions
  - Potentially a proof-of-concept or prototype
- Specific examples coming later today

# Frequently Asked Questions

- Data and confidentiality
  - Built into Capstone agreement
- Intellectual property
  - Owned by students
  - Company can declare interest in acquiring after Capstone
- Beyond the Capstone
  - Students can be approached for employment
  - “Renewing” Capstones is easy
  - Transition to sponsored research

# MSBA. *Program Overview*

- The MSBA program is an online masters program over 18 months that helps student to advance their knowledge of how to solve business progress through analytics.
- Students typically are working data scientists with a median of 4-5 years of work experience.
- The program provides course work in
  - Analytics. Machine Learning and Optimization
  - Software. R, Python, Tableau, Data Base Management
  - Communication and working in teams. Presenting technical results to non-technical stakeholders
  - Business Domain Knowledge around marketing, operations, accounting, finance and people analytics

# MSBA. *Capstone Projects*

- Provide a “real-life experience” in analytics to foster an integrative learning experience that brings together their learnings from the program.
- Sponsor defines a business problem and a dataset for solving the program. The capstone team (~four students and a faculty advisor) propose and implement an analytical approach to solve the problem.
- Sponsors should:
  - Choose an interesting, relevant problem
  - Sponsor agrees to have stakeholders participate in kick-off, mid-term presentation to review results to date and prototype, and final presentation
  - Identify a point of contact that is willing to discuss questions about the problem and data on a (bi-)weekly basis.
  - Provide confidential data (usually anonymized) per Educational Project Agreement
- The team will deliver presentations to communicate findings, software to replicate findings, and potential software artifacts



# MSBA. *Example Capstone Projects*

1. CPG manufacturer needs to understand how to adjust market forecasts in the presence of COVID-19 intervention. Has experienced positive sales growth due to more people staying at home
2. B2B distributor wants to build SKU-level forecasting system to optimize inventory levels (thousands of customers X hundreds of products X region X time)
3. Social media platform wants to encourage infrequent contributors to become more frequent
4. Major US bank wants to improve customer acquisition in regions with sparse activity
5. Medical diagnostic company wants to improve staffing levels of its service teams so that 95% of service calls are serviced within a day
6. How to reduce costs for the last mile delivery costs of parcel service by offering incentives to consumers to consolidate deliveries (e.g., \$5 gift card to receive packages on Tues & Thurs)
7. Startup web company that offers interviewing aids wants to use text mining to aid users in improving their interviews. (Worked in conjunction with MBA team on product strategy)

**MSPM**

**What is an MS in Product Management?**

# MSPM



Source: [twitter.com @freakonomics](https://twitter.com/freakonomics)



**Carnegie  
Mellon  
University**  
School of  
Computer  
Science

**MSPM**

**For whom does the MS in Product  
Management exist?**

# MSPM

“We’ve been trying to fill this PM role for the past six months! Nobody has the right skills.”



Source: [quantumworkplace.com](https://www.quantumworkplace.com)

# MSPM



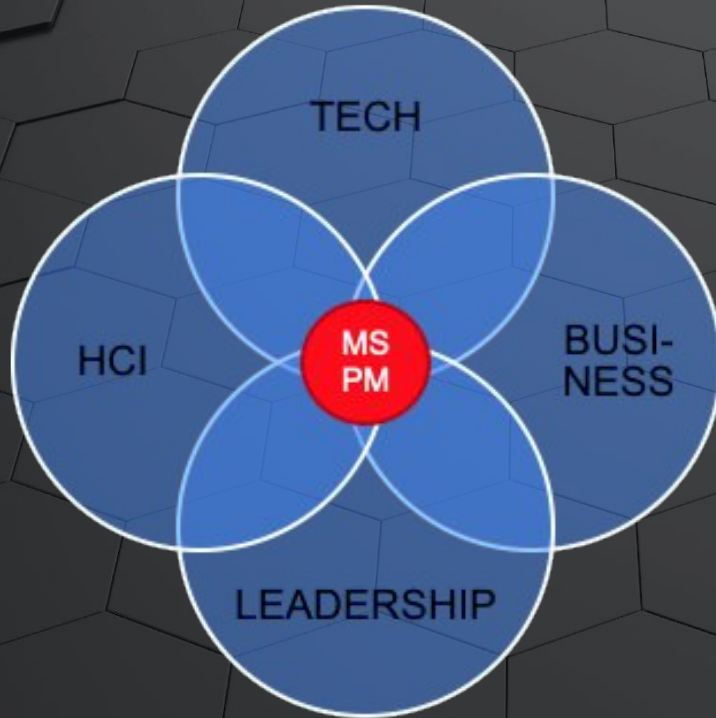
“We have a backlog of 200 product-related projects to tackle.”

Source: [shrm.com](https://www.shrm.com)

**MSPM**

**What do MSPM students bring?**

# MSPM



- ~7 years average exp.
- Variety of backgrounds:
  - ½ Computer Science
  - ¼ Other Engineering
  - ¼ Business and Misc.
- Many have grad degrees
- Tech, design, and business courses
- PM internship experience
- “I’m ready to take the leap.”



**MSPM**

**What are the basic details?**

# MSPM

Capstone Timing – FALL semester

Team Structure – Typically 3 students + industry advisor

Sponsor's Time – Kickoff, weekly updates, final presentation

Contact - Reach out now to discuss potential projects

Brad Eiben, Executive Director

[beiben@andrew.cmu.edu](mailto:beiben@andrew.cmu.edu)

**MSPM**

**What do the projects look like?**

# MSPM

**CUSTOMER DISCOVERY:** Explore a new vertical market for a real estate product. The student team conducted problem discovery on how companies select locations for new stores. This included cold contacting hundreds of leads, interviewing ~25; doing market sizing, creating personas, defining capabilities and a roadmap based on the existing product.

**BUSINESS PROCESS:** A healthcare company is looking to disrupt the slow, expensive, and bureaucratic process of supplying equipment to a specific type of customer. Students were tasked with designing new, streamlined workflow models to accomplish this goal. They presented a marketplace model and accompanying financial models.

**USER EXPERIENCE:** Improve usability of a robotic process automation tool such that non-engineers are able to use it. Perform competitive analysis and identify opportunities for features that may create advantage.

**STRATEGY:** For a venture company, create a framework to steer portfolio decisions and priorities. This required the students to develop workflows and processes to prioritize information, stakeholders, and feature requests.

**INNOVATION:** Open-ended challenge to identify opportunities in the transportation space to revolutionize the sponsor's business model in preparation for electric vehicles and reduced fuel dependency.

**DATA SCIENCE:** A retailer knows that their system is stacking discounts in an unintended manner. Build and test a model to detect and rank the unintended discounts.

MSPM

Where do recent grads and interns work?



PointClickCare



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Fidelity  
INVESTMENTS

indeed®

MSPM

See our blog success story...



Deb Sasmal turned his capstone project with UPMC Enterprises into a fulfilling career.

[HOW A CAPSTONE PROJECT LED TO A ROBUST FUTURE IN PRODUCT MANAGEMENT. | Product Management Unpacked \(cmu.edu\)](#)

# MSPM

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## SPRING

- Core Product Management courses
- Semester-long project course
- Active search for internship
- Core Business

## SUMMER

- Product Management Internship
- Online meetings throughout summer
- Reflection paper due at end of summer

## FALL

- Semester-long capstone project
- Advanced CS and HCI courses
- Advanced Business electives
- Active job search

Accelerate Leadership  
Development

# Overview: Master of Human-Computer Interaction (MHCI)

- Established in 1996 & first program of its kind
- 25 years later, have 1,000+ alumni with many industry leaders
- Uniquely situated in the CMU School of Computer Science
- One-year professional program with 65 students who work on a two-semester Capstone
- MHCI Capstone sponsors have included companies such as Google, Amazon, Bloomberg, and NASA
- Students take positions as Product Designers, User Experience Researchers, Interaction Designers, Service Designers and User Experience Engineers



# Student pedigree, learning outcomes and pedagogy

- Students generally have undergraduate degrees in computer science, design, cognitive psychology and about 3 years of employment experience
- Students learn theory, methods, practices and approaches from design, behavioral sciences and technology, and apply them in team-based projects that reflect the challenges of modern business
- Graduate “whole” HCI professionals by filling the gaps that individual students have in knowledge and experience applying learning in real-life scenarios
- Students become leaders by executing research, interpretation, sensemaking, strategy, conceptual design, interaction design, UI design, prototyping, and testing/validating—the full range of activities involved in creating business value through human-computer interaction

# A Wide Variety of Companies Employ MHCI Grads

- » NASA
- » Bloomberg
- » Apple
- » Google
- » Amazon
- » Accenture
- » MicroSoft
- » Goldman Sachs
- » Mastercard
- » Byton
- » über
- » Facebook
- » Duolingo
- » C3.ai
- » Airbnb
- » Capital One
- » BCG / Plantinium
- » Verizon
- » Stack Overflow
- » Pixar
- » Intuit
- » Thumbtack
- » Zenefits
- » Deloitte Digital
- » American Eagle Outfitters
- » Medium
- » Figma
- » PunchCut
- » SigFig
- » Prolific Interactive
- » Expedia Group
- » Electronic Arts
- » DesignIt
- » Eaton
- » Eli Lilly
- » Walmart Labs
- » Fiat Chrysler Automotive
- » IBM
- » Mercedes Benz
- » HealthStream
- » Nvidia
- » Indeed.com
- » User Research International
- » Hinge Health
- » GoPro
- » Weight Watchers
- » Houzz
- » Local Projects
- » BuzzFeed
- » PNC Bank
- » UPMC Enterprises
- » Reonomy
- » Zazzle
- » Magic Leap
- » Slalom
- » USAA
- » Turnitin
- » Nuna
- » Cisco
- » Lutron
- » Exxonmobile
- » Jet Propulsion Laboratory
- » Oracle
- » JP Morgan Chase
- » Johnson & Johnson
- » Wondros
- » SDLC
- » RocketAir
- » CGI
- » Workday
- » Twitter
- » Matrix Partners (VC)
- » Docusign
- » Citrix
- » Draper Labs
- » Change.org
- » Cleo
- » Robots & Pencils
- » Deloitte Digital
- » 3Com
- » Aurora
- » Virgin Pulse
- » ServiceNow
- » US Bank
- » VMWare
- » TikTok
- » Publicis Sapiient
- » ZipRecruiter

# 2021 MHCI Capstone Portfolio

<b>NASA</b>	Using Asynchronous Communication to Support Procedure Execution During Deep Space Missions
<b>Carmax</b>	Delivering an End-to-End Car Buying Experience through Agents with Different Embodiments, Modalities & Contexts
<b>InterDigital</b>	Employing User-Centered Design to Speculate about the Future of Digital Television and Compel Investment
<b>Bloomberg</b>	Optimizing Human Computational System Interaction
<b>Optum</b>	Designing Near & Distant Futures for a Digital Service for Employees During & After the COVID-19 Pandemic
<b>99P Labs</b>	Envisioning the Future of Social Interaction in Automobiles
<b>Pacific Northwest National Laboratories</b>	Experience not Experiment: Helping Impaired Users Evaluate & Trust Algorithms that Detect Misinformation, Disinformation & Deception
<b>Pandemic Professors</b>	Improving the Efficiency & Effectiveness of an Innovative Digital Learning Service
<b>SWPPA</b>	Age-Friendly Travel: Advanced Tech in Support of the Challenges of a Historically Neglected Population
<b>Clemente Museum</b>	Arriba! Defying Time & Space to Experience the Roberto Clemente Museum in Latin America
<b>PA WIC</b>	Mommy, When Do We Get to Go Back to the WIC Clinic?
<b>SCS Grad Program</b>	Envisioning the Next Generation Graduate Program System while Addressing Near-Term Usability Needs

# Amazon Music MHCI Capstone Project

## 2020 Amazon Music MHCI Capstone Project Description

### Using Music as a Design Material that Bridges Digital, in Real Life (IRL), Communal & Individual Experiences

**Amazon Music offers a full-catalog streaming service that operates in numerous countries around the world and provides customer access to more than 50 million songs across many different voice (Alexa) and visual platforms. Amazon Music works relentlessly to understand the role of music in people's lives and how it can design services that people desire.**

#### **Project Summary**

The focus of this project is to look 3-5 years out and develop concepts that leverage Amazon Music's offerings and reach to bridge digital, in real life (IRL), communal and individual experiences via the use of new devices and emerging technology. Amazon Music sees an opportunity to create new experiences with its music, apps and services that reduce or eliminate the barriers between fans who have private digital experiences and "in real life" (IRL) experiences. The company seeks innovative designs that situate its current offerings and speculative designs in an environment comprised of wearables, sensors, audio output, high-performing digital networks, AR/VR/MR and a variety of emerging

NOW PLAYING



Eye of the Tiger  
Survivor



CURRENT HEART RATE

♥ 121

# Wall++

Interactive & Context Sensing Walls



# Engaging with the MHCI Program

Contact Jessica Vogt, HCII Engagement Manager at;

- [vogtj@cmu.edu](mailto:vogtj@cmu.edu)

Get more information about the MHCI at;

- <https://www.hcii.cmu.edu/academics/mhci>

See Many MHCI Capstone projects at;

- <https://www.hcii.cmu.edu/research/mhci-capstone/grid>

# Faculty Presentation

ENAiBLE

A CMU Retail & Services Collaborative

## How to Engage with Research at CMU: Capstone Projects

Stay tuned for email notice of the recording, including helpful links to the capstone programs mentioned today and a brochure highlighting other capstones relevant to the ENAiBLE community.

NOTE: ENAiBLE will be taking a break from programming during July and August. We look forward to seeing you again in September!

Give us your feedback and ideas for future events at [enaible@cmu.edu](mailto:enaible@cmu.edu)

### *We are accepting new sponsors!*

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- Community of design- and technology-minded experts from industry and academia.

To learn more about sponsorship, contact

**Chris Kissell** at [enaible@cmu.edu](mailto:enaible@cmu.edu)

To learn more about ENAiBLE, visit us at  
[cmu.edu/enaible](http://cmu.edu/enaible)



# Capstone Programs at CMU (not exhaustive)

- MBA Business Analytics Track
- MBA Technology, Strategy and Product Management Track
- **Master of Science in Business Analytics (MSBA)**
- Carnegie Mellon Corporate Startup Lab (CSL)
- **Master of Science in Product Management (MSPM)**
- Master of Computational Data Science (MCDS)
- Masters of Educational Technology and Applied Learning Science (METALS)
- Master of Science in Intelligent Information Systems (MIIS)
- **Master of Human-Computer Interaction (MHCI)**
- Master of Information Technology Strategy Program (MITS)
- Master of Science Robotic Systems Development (MRSD)
- Master of Science in Artificial Intelligence and Innovation (MSAI)
- Masters of Science in Automated Science (MSAS)
- Master of Science in Computer Vision (MSCV)
- Master of Software Engineering Degree Program (MSE)
- Robotics Systems Engineering
- Master of Science in Information Technology – Privacy Engineering (MSIT-PE)

# Tips for Avoiding Potential Failure Points

- Define the right scope: project should not be too narrow or too broad
- Avoid critical path projects, but choose projects that allow you to explore "if I had the time, then I would like to..."
- Have data ready since projects only have a short time to complete
- Include the stakeholders at the launch of the project
- Give the team leeway to use their creativity
- Interact with the team and define project boundaries

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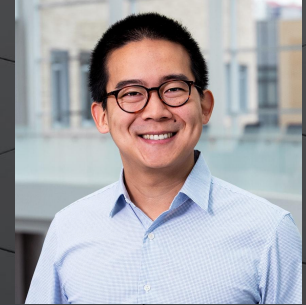
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