Technology Start-ups
Lecture 1

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Previously: JP Morgan Faculty Fellow, Institute for Financial Services Analytics

Startup Experience

- Founder and CEO, Cyber 20/20 Inc.
- Mach37 Accelerator program
- NSF I-Corps program
My Research

COMPILERS

MACHINE LEARNING

Synta
CodeGen
Semantics Types

High Performance Computing

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Why Take This Class? (1/2)

- Interested in starting or working at a startup?
  - 9/10 startups fail!
  - Derisk your product
• Interested in succeeding in an established company?
  • Many new products and/or development efforts fail!
  • Derisk your ideas
Lecture 1: Overview

- Structure of Course
- Administrivia
- Running Lean (Chapter 1)
- Let’s Get into Groups
1. Concept/Idea

- Syntax
- Semantics
- CodeGen
- Types

MACHINE LEARNING

High Performance Computing

Cloud Computing

Chatbot

Cyber security

COMPILERS
2. Build-Measure-Learn Loop

- **LEARN**: (whether to pivot or persevere)
- **IDEA**: (Turn ideas into product)
- **BUILD**: (often a series of MVPs)
- **MEASURE**: (How customers respond)
- **DATA**: 
- **PRODUCT**: 

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Lean Canvas

1. Problem
   - Top 3 problems
   - Existing alternatives

2. Customer segments
   - Target customers
   - Early adopters?

3. Unique value proposition
   - Can’t be easily copied or bought
   - Why makes you different? Why pay attention to you?

4. Solution
   - Top 3 features
   - e.g. AARRR

5. Channels
   - Path to customers

6. Revenue streams
   - Revenue model, lifetime value, revenue, gross margin

7. Cost Structure
   - Customer acquisition, distribution, people, etc.

8. Key metrics
   - Clear compelling message. Why makes you different? Why pay attention to you?

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Lean Canvas, from Ash Mauny: Running Lean. Licensed under Creative Commons-Attribution-Share Alike 3.0
Structure of the Course

- Lectures by myself on lean startup
- Guest lectures on other important aspects
- Starting in couple weeks
  - Student presentations
    - Present research paper on related tech
    - Profile one technology startup
  - Project status updates
Project Status Updates?

- Students create a startup
  - Small groups of students per startup
  - Project status
    - Present evolving lean canvas
    - Discuss status on tech development
    - Discuss customer discovery interviews
  - Project reports
    - Due midterm and end of semester
    - Work proportional to size of team
Project 1: Design

- Choose a topic of interest (from list instructor specifies)
- Ideation and design
  - Extensive wire frame design
  - Website
- Project Report
  - ~2 pages per team member
  - Template available online (font size, margins, etc.)
- Project hand out available soon
Project 2: Implementation

- Extension of Project 1 (recommended)
- Extensive programming and/or analysis
- Deliverable: Report (~2 pgs per team member)
  - Conference paper format
  - Project presentation (~10 mins)
- Project handout available in a couple weeks
Basis for Grading

- Your individual paper presentations (20%)
- Class Quizzes (5%)
- Team Projects (75%)
  - Project 1 (30%)
    - Presentations and Project Report
  - Project 2 (45%)
    - Presentations and Project Report

No Midterm or Final!
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Background/References

- Should be familiar with a programming language
- Textbook
Project Guidelines

- Reports should be
  - Well-written and formatted correctly
  - Properly referenced
  - Results should be presented with graphs
  - Intellectual merit most important factor

- Negative result is fine
  - However, must demonstrate something interesting
Expectations

- Class participation
- Ask questions
- Challenge all speakers.
- NOT a lecture class or a passive experience. ACTIVE learning.
- Most common project problem: Not getting started
- Ask for help if you need it!
  - I will hold office hours Saxby’s on Amstel Ave.
    - Email *first* me whenever you want an appointment.
  - Require checkpoints to show me status!
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Why do startups fail?

Because they build the wrong product!
Why do startups build the wrong product?

- You fall in love with your solution

> We built it and we didn’t expect it to be a company, we were just building this because we thought it was awesome.

- Mark Zuckerberg

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Why do startups build the wrong product?

- Product development gets in the way

![Diagram showing the product development process with stages: Requirements -> Development -> QA -> Release. Arrows indicate some learning, most learning happens here, and very little learning.](image-url)
Why do startups build the wrong product?

- Startups don’t listen to customers

*If I had asked people what they wanted, they would have said faster horses.*

-Henry Ford

*It is not your customer’s job to know what they want.*

-Steve Jobs
How do startups build the right product?
Use the Lean Startup methodology!

Document your Plan A

Identify the riskiest parts of your plan

Systematically test your plan
Chapter 1: Meta-Principles

Business model vs Business plan
Business Model

- A single diagram
- 15 minutes to develop first draft
- Iterate until product/market fit achieved
  - Learning by “Getting out of the building”

Lean Canvas
• A long document
• Often takes weeks to months to complete
• Little to no customer interaction
  • “Stay in the building”
Step 1: Document your Plan A

Note: Your Plan A is often wrong!
Step 2: Identify the Riskiest Parts
Three Stages of a Startup

Stage 1: Problem/Solution Fit

Stage 2: Product/Market Fit

Stage 3: Scale

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Stage 1: Do I have a problem worth solving?

Decide what to build in the minimum viable product (MVP).
Minimum Viable Product (MVP)

Not like this...

Instead like this!
Stage 2: Have I built something people want?
Show MVP to customers.
Don’t push features. Features should be pulled!
Stage 3: How do I accelerate growth?
Scaling your business model.
Chapter 1: Meta-Principles

Step 3: Systematically test your Plan

LEARN
(whether to pivot or persevere)

IDEA

BUILD
(Turn ideas into product)

DATA

PRODUCT

MEASURE
(How customers respond)
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Let’s get into groups

Based on a Concept or Idea

- Machine Learning
- Cybersecurity
- High Performance Computing
- Cloud Computing

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