09/05: Project Plan

The Capstone Experience

Dr. Wayne Dyksen
Department of Computer Science and Engineering
Michigan State University
Fall 2018
Project Plan

- Functional Specifications
- Design Specifications
- Technical Specifications

- Risks and Prototypes
- Schedule and Teamwork

Future Meetings
Project Plan

- Functional Specifications
  - Design Specifications
  - Technical Specifications
  - Risks and Prototypes
  - Schedule and Teamwork

Future Meetings
Functional Specifications

• What does it do?
  (Not “how” does it do it?)
  ▪ What’s your client’s problem?
  ▪ What’s your solution?

• Includes
  ▪ List of Objectives
  ▪ Use Cases

• Not Necessarily Complete

• Understandable by End User

• Initial Problem Statement

• Usually Refined
Functional Specifications

• Amazon
  ▪ Leverage Growing Internet Video Watching
  ▪ Market Amazon Products in Contextual and Personalized Ways

• MSUFCU
  ▪ Visualize MSUFCU Members’ Spending Habits
  ▪ Send Alerts About Unusual Account Activity

• Whirlpool
  ▪ Annotate and Validate Images of Recipe Ingredients
  ▪ Apply Crowdsourcing and Gamification
  ▪ Target Whirlpool’s Yummly App
Functional Specifications
Interactions With Your Client

• Derived With/From Client
• Documented For Client
• Presented to Client
• Agreed Upon With Client
• Your Job to Capture the Client’s Intent!
Project Plan

- Functional Specifications
- Design Specifications
  - Technical Specifications
  - Risks and Prototypes
  - Schedule and Teamwork

Future Meetings
Design Specifications

• What’s the user experience (UX)?
  ▪ How does a user use it?
  ▪ How does it look and feel?

• Includes
  ▪ Business Process Flow
  ▪ Specific Features
  ▪ Use Cases
  ▪ Screen Mockups
  ▪ Data Flow Diagrams
  ▪ Data Organization
  ▪ Etc...

• Identifies All the Parts and Their Interactions
• (Mostly) Understandable by End User
• Usually Refined
Design Specifications

- **Aptive**
  - Enable Scheduling Vehicles for Use
  - Provide Real-Time Access to Vehicle Data
  - Support Web, Android and Apple iOS
  - Integrate Apps Into Existing Aptiv Tool
  - Create Complete Documentation

- **Meijer**
  - Capture Essential Product Data
  - Select and Implement Tracking Mechanism
  - Establish Trigger/Alert Mechanisms
  - Ensure Proper Movement of Products
  - Get Close-Dated Products For Sale Quickly
  - Identify Recalled Products
  - Store Data in Blockchain

- **United Airlines**
  - Build Database of Complete Kits
  - Support Mobile Device Cameras
  - Apply Computer Vision
  - Send Notifications
  - Provide Companion Administrative Web Portal

Mostly Understandable by End User
Screen Mockups

- User Interface Only
  - Shows Layout, Buttons, Pull-Downs, Etc...
  - Non-Functional
  - No Back End
- Helpful for Developing
  - Functional Specifications
  - Look-and-Feel
  - Use Cases
- Can Create with...
  - Pencil and Paper
  - PowerPoint (Developer View)
  - Photoshop
  - Etc...
- NOT Screen Captures of Other Software
Screen Mockups

• “Use” with Clients
  ▪ Show to Clients
  ▪ Go Through Use Cases with Clients

• “Cruder” may be better.
  ▪ What?
  ▪ Why?
Login Page

User Id

Password

Remember Me

Submit
Landing Page

Welcome to Our App
Screen Mockup Example
Screen Mockups Example

Tap the "Adjust" button and sit in your chair to begin guided adjustment.

Aeron (remastered)
Screen Mockups Example
Design Specifications
Interactions With Your Client

• Derived With/From Client
• Documented For Client
• Presented to Client
• Agreed Upon With Client
• Your Job to Capture the Client’s Intent!
Project Plan

✓ Functional Specifications
✓ Design Specifications

➢ Technical Specifications

• Risks and Prototypes
• Schedule and Teamwork

Future Meetings
Technical Specification

• How does it do it?
• Identifies All the Parts and Their Interactions
• Everything a Developer Needs to Write the Code
• Includes Things Like...
  ▪ Overall System Architecture
  ▪ Machine Architectures
  ▪ Software Technologies
  ▪ Production Environments
  ▪ Development Environments
  ▪ SDK’s (Software Development Kits)
  ▪ Network Topology
  ▪ Database Schema
  ▪ Continued...
Technical Specification

- Includes Things Like...
  - Object Models and Class Diagrams
  - UML Diagrams
  - Pseudo Code
  - Function Prototypes
  - Schedule
  - Test Plan
  - Risk Analysis
  - Etc...

- Probably Not Understandable by End User
- Usually Refined
Technical Specifications

- Ford
  - Java / Spring Framework
  - Python Natural Language Toolkit
  - Slack
  - HTML5
  - RESTful Web Services
- Mozilla / Firefox
  - Firefox Code Base (~ 51M Lines)
  - CSS / XUL / XBL / HTML
  - C++ / JavaScript
  - Fluent
  - Document Type Definition (DTD)
  - Mercurial
  - IRCCloud
  - Bugzilla
  - Phabricator
  - Microsoft Windows, Apple macOS and Linux
- Proofpoint
  - Cuckoo (Malware Sandboxing)
  - Suricata (Intrusion Detection System)
  - Operating Systems and Compilers
  - Reverse Engineering
  - Python / JavaScript
  - MySQL

Probably Not Understandable by End User
System Architecture Example
System Architecture Example

Diagram showing the architecture of a system, including components such as Malware, PE Hash, Dynamic Decision Logic, Signature Information Aggregator, Cuckoo Malware Sandbox, SQLite Database Server, Postman API, Apache Web Server, and Bootstrap Javascript Framework.
System Architecture Example
Approach

• Break Big Problems Into Smaller Problems
• Identify Constraints
• Identify “Risks” — Things You Don’t…
  ▪ ...Know
  ▪ ...Understand
  ▪ ...Know How To Do
• Consider Tradeoffs
• Select Appropriate Technologies
• Identify Core Features for a Prototype
Technical Specifications

Interactions With Your Client

• Derived With/From Client
• Documented For Client
• Presented to Client
• Agreed Upon With Client
• Your Job to Capture the Client’s Intent!

Cannot be emphasized enough!
Project Plan Summary

• Specifications
  ▪ Functional: What does it do?
  ▪ Design: How does it look and feel?
  ▪ Technical: How does it do it?

• Testing Plan

• Schedule
How To’s

• Quickly identify...
  ▪ ...what you don’t know,
  ▪ ...what you don’t understand, and
  ▪ ...what you don’t know how to do.

• Conceptually...
  ▪ Start with functional specifications.
    o Get agreement with client.
    o Include as first part of project plan.
  ▪ Do design specifications.
    o Get agreement with client.
    o Include as 2nd part of project plan.
  ▪ Do technical specifications.
    o Get agreement with client.
    o Include as 3rd part of project plan.
  ▪ Do schedule.
  ▪ Do development, testing, and deployment.

• In CSE498, must do all three in parallel (and iterate).
How To’s

• Approach
  - Make Skeleton Document Immediately
    o Will Get You Organized and Focused
    o Include “Under Construction” Sections (Totally Empty)
  - Develop In Parallel When Possible But...
    o Complete Functional First
    o Complete Design Second
    o Complete Technical Third
  - Refine As Needed
  - Assign Sections to Team Members
  - Share with Client
    o Ask For (Specific) Feedback
    o Highlight What’s New
    o Tricky Balance
      - Not Enough?
      - Too Much?

“Is this what you had in mind?”
How To’s

• Schedule
  ▪ Dictated by Course
  ▪ Schedules > Major Milestones
    o 09/17: Status Report Presentations
    o 09/24: Project Plan Presentations
    o 10/15: Alpha Presentations
    o 11/12: Beta Presentations
    o 12/03: Project Videos
    o 12/05: All Deliverables
    o 12/06: Design Day Setup
    o 12/07: Design Day
    o 12/11: Project Videos
  ▪ Other Milestones By Educated Guesses
  ▪ Track To It At Least Weekly at Triage Meetings
  ▪ Revisit Often and Revise If Necessary
  ▪ Delivery Slippage == Graduation Slippage
How To’s

• “Living Document”

• Make Sure Your Project Plan Has…
  ▪ Cover Page
  ▪ Title
  ▪ Table of Content
  ▪ Page Numbers
  ▪ Headers and Footers
  ▪ Etc...

(That is, make sure your plan looks professional.)
Interactions With Client

Client May Specify...
• Requirements
  ▪ Functional
  ▪ Design
  ▪ Technical Requirements
    o Operating Systems
    o Programming Languages and Environments
    o Web Technologies
    o Etc...
  ▪ Legacy
• Milestones
• Etc...
(You may explore and propose other ideas.)
Nota Bene: Project Plan

• Must Use Windows Microsoft Office
  ▪ Word and PowerPoint
  ▪ Included with Windows 10 VM.
  ▪ Get it done now!
  ▪ (Do not attempt to use anything other than Windows Microsoft Office.)
• How many...
  ▪ ...drafts will you write? Many.
  ▪ ...drafts will you share with your client? A Couple.
  ▪ ...final documents will you submit for CSE498? One
• Due Date
  ▪ 12:01 a.m., Monday, September 24 (Think Sunday night.)
  ▪ ~ 2.5 Weeks
• In Class Formal Presentations
  ▪ September 24 – October 3
  ▪ PowerPoint Template Provided

Get on it, now!
Resources on the Web

• **Other Links > Downloads**
  
  **Project Plan Examples**
  
  - **Fall 2017**
    - Team Michigan State University
    - Team MSUFCU
  
  - **Spring 2018**
    - Team Herman Miller
    - Team Proofpoint

• **High Resolution Sponsor Logo**
  
  www.capstone.cse.msu.edu/2018-08/projects/<sponsor>/images/originals/sponsor-logo.png
  
  http://www.capstone.cse.msu.edu/2018-08/projects/auto-owners/images/originals/sponsor-logo.png
Project Plan

- Functional Specifications
- Design Specifications
- Technical Specifications

- Risks and Prototypes
- Schedule and Teamwork

Future Meetings