MICHIGAN STATE UNIVERSITY

09/05: Project Plan

The Capstone Experience

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From Students…
…to Professionals

Project Plan

- Functional Specifications

- Design Specifications

- Technical Specifications

Functional Specifications

- What does it do?
  (Not “how” does it do it?)
  - What’s the problem?
  - What’s your solution?
- Short List of Features
- Not Necessarily Complete
- Starting With
  - Shared Vision?
  - No Formal Documents?
  - Minimal Documents?
  - Incomplete Problem Statement?
- Understandable by End User
- Initial Problem Statement
- Usually Refined

Functional Specifications

- Auto-Owners
  - Make Electronic Deposits Into Annuity Accounts
  - By Annuity Policyholder, Family, and Friends
  - Via Web Apps, Both Classic and Mobile
- Meijer
  - Page IT Team Members
  - Via Web App
  - To Address Computer System Issues
- Spectrum Health
  - Manage Shortages of Key Medications
  - Chose Best Course of Action
    - Weather the Shortage
    - Seek Additional Stock from the Grey Market
    - Swap the Medication for an Alternative

Understandable by End User

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

Design Specifications

- How does it look and feel?
- Includes
  - “Business” Process Flow
  - 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

- GE Aviation
  - Intuitive, Easy-to-Use Interface
  - Interactions
    - Translation, Scaling and Rotation
    - Geo-Located Touch Sensitivity
  - Fast and Efficient Image Processing
    - Manipulation Algorithms
    - Data Caching
- Mozilla
  - Decluttered View
  - Dimmed or Removed Irrelevant Content
  - Styled Reading Content
- Quicken Loans
  - Multimedia Notes
  - Four Primary Inputs
    - On-Screen Keyboard
    - Free Form Drawing
    - Photo and/or Camera
    - Audio
  - Incorporate Metadata

Mostly Understandable by End User

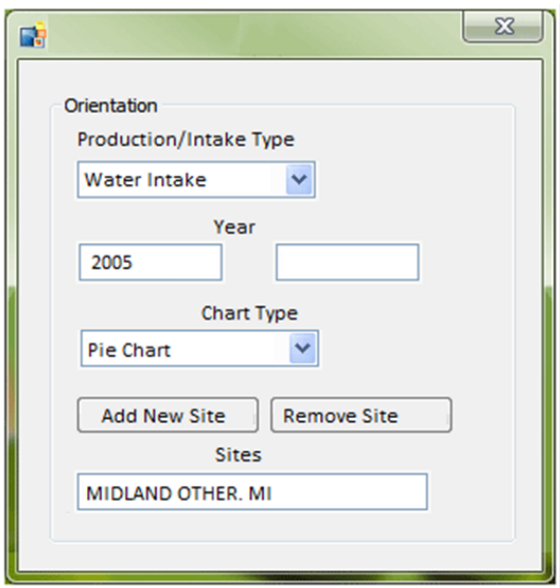
Screen Mockups

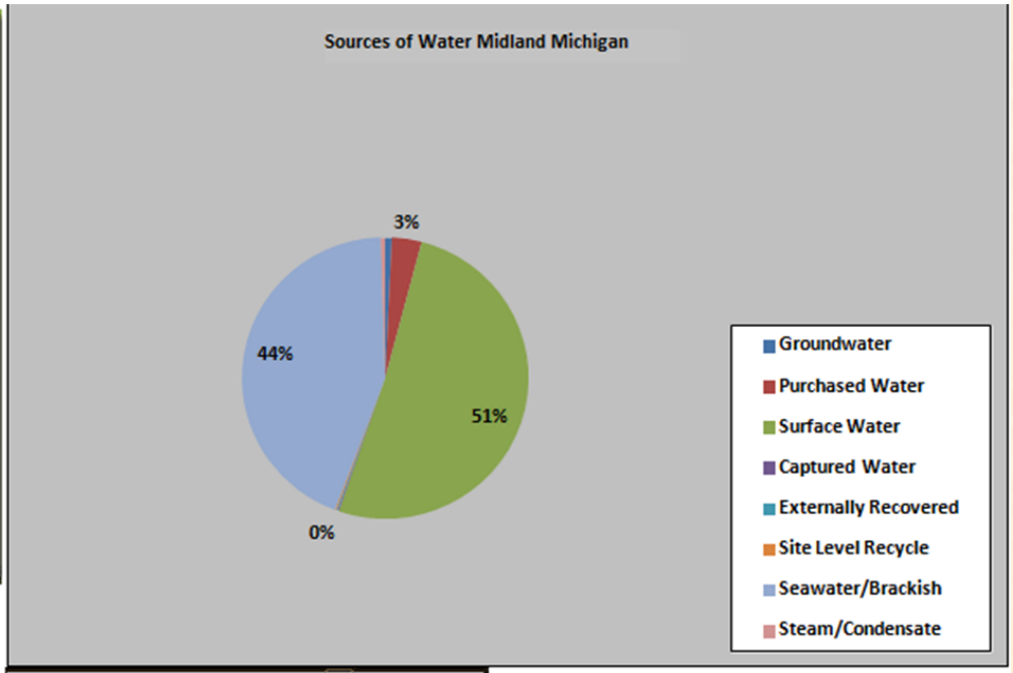
- User Interface Only
  - Shows Layout, Buttons, Pull-Downs, Etc…
  - Non-Functional
  - No Back End
- Helpful for Developing
  - Functional Specifications
  - Look-and-Feel
  - Use Cases
- Can Create with…
  - Pencil and Paper
  - PowerPoint (Developer View)
  - Photoshop
  - Etc…

Screen Mockups

- “Use” with Clients
  - Show to Clients
  - Go Through Use Cases with Clients
- “Cruder” may be better.
  - What?
  - Why?

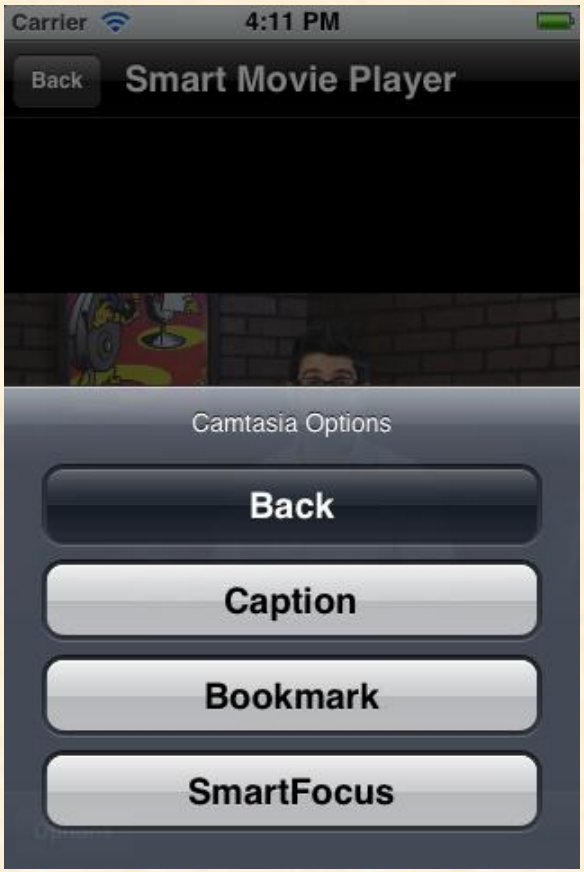
Screen Mockups Example

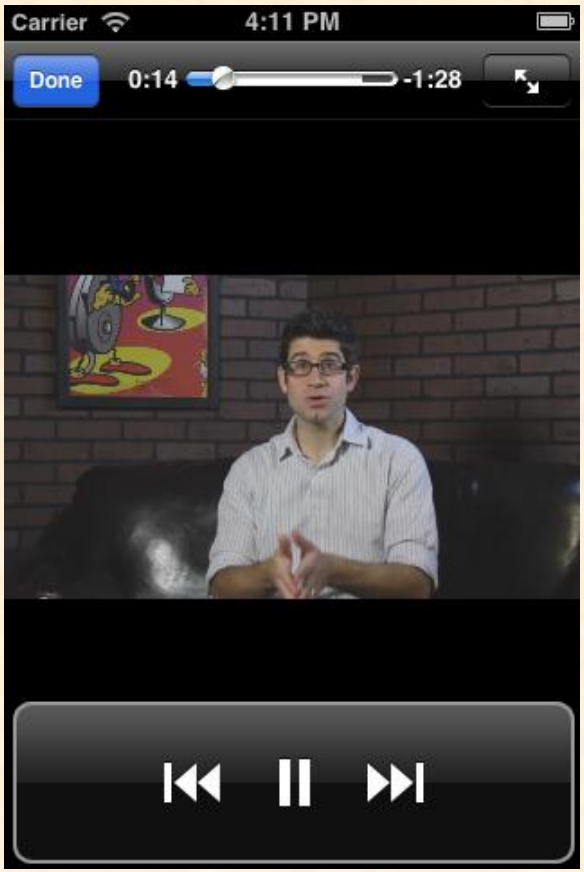




Row Labels	Sum of 2005
MIDLAND OTHER, MI	34097
Freshwater One Pass Cooling	4011
Potable Water	4011
Process Water	4011
Purchased Water	4013
Steam/Condensate	4011
Steam/Condensate Production	4011
Surface Water	6018
Transfer to Third Party	4011
Grand Total	34097

Screen Mockup Example





Design Specifications
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Project Plan

✓Functional Specifications

✓Design Specifications

➢Technical Specifications

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

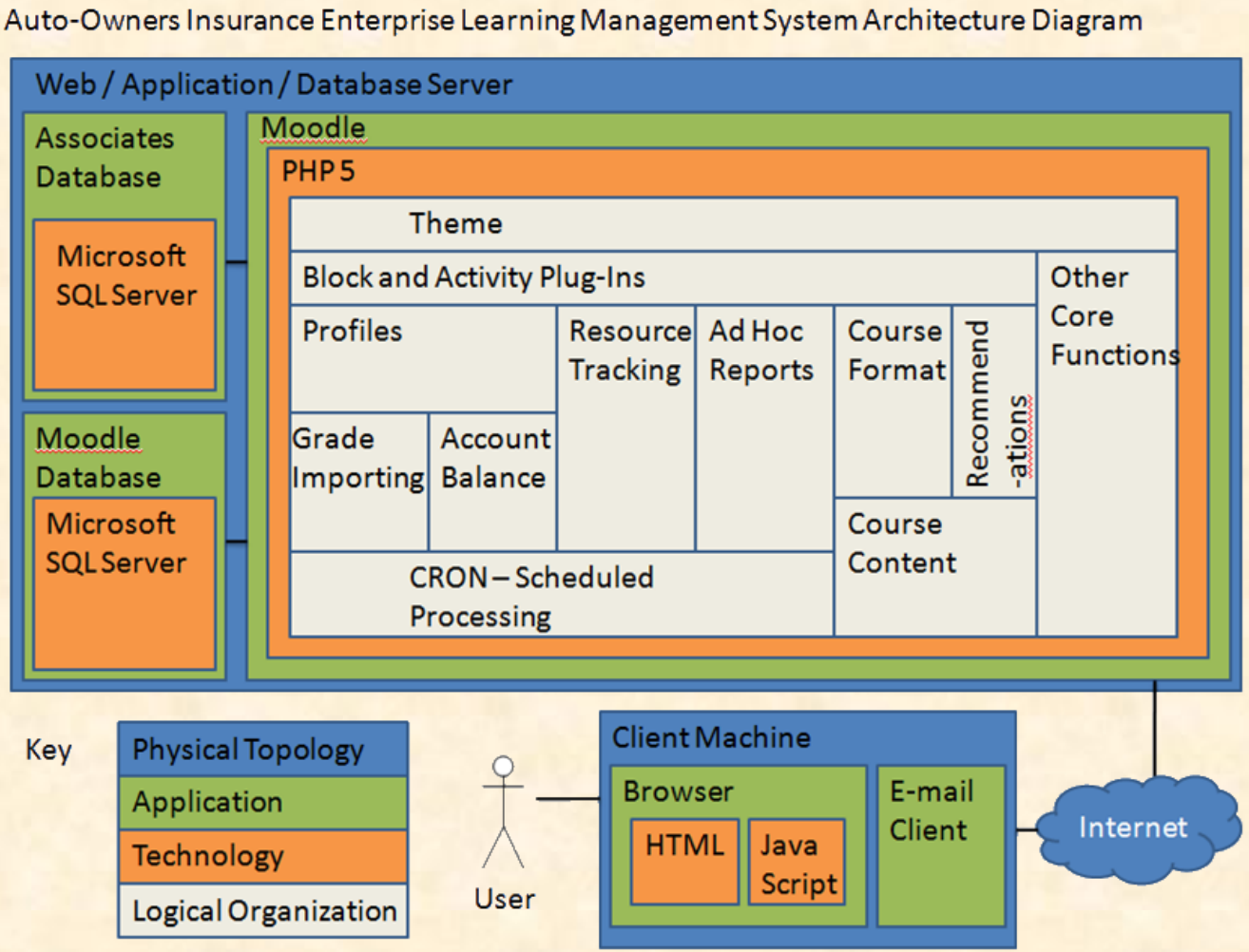
- Includes Things Like…
  - Object Models and Class Diagrams
  - UML Diagrams
  - Pseudo Code
  - Function Prototypes
  - Schedule
  - Test Plan
  - Risk Analysis
  - Etc…
- Probably Not Understandable by End User
- Usually Refined

Technical Specifications

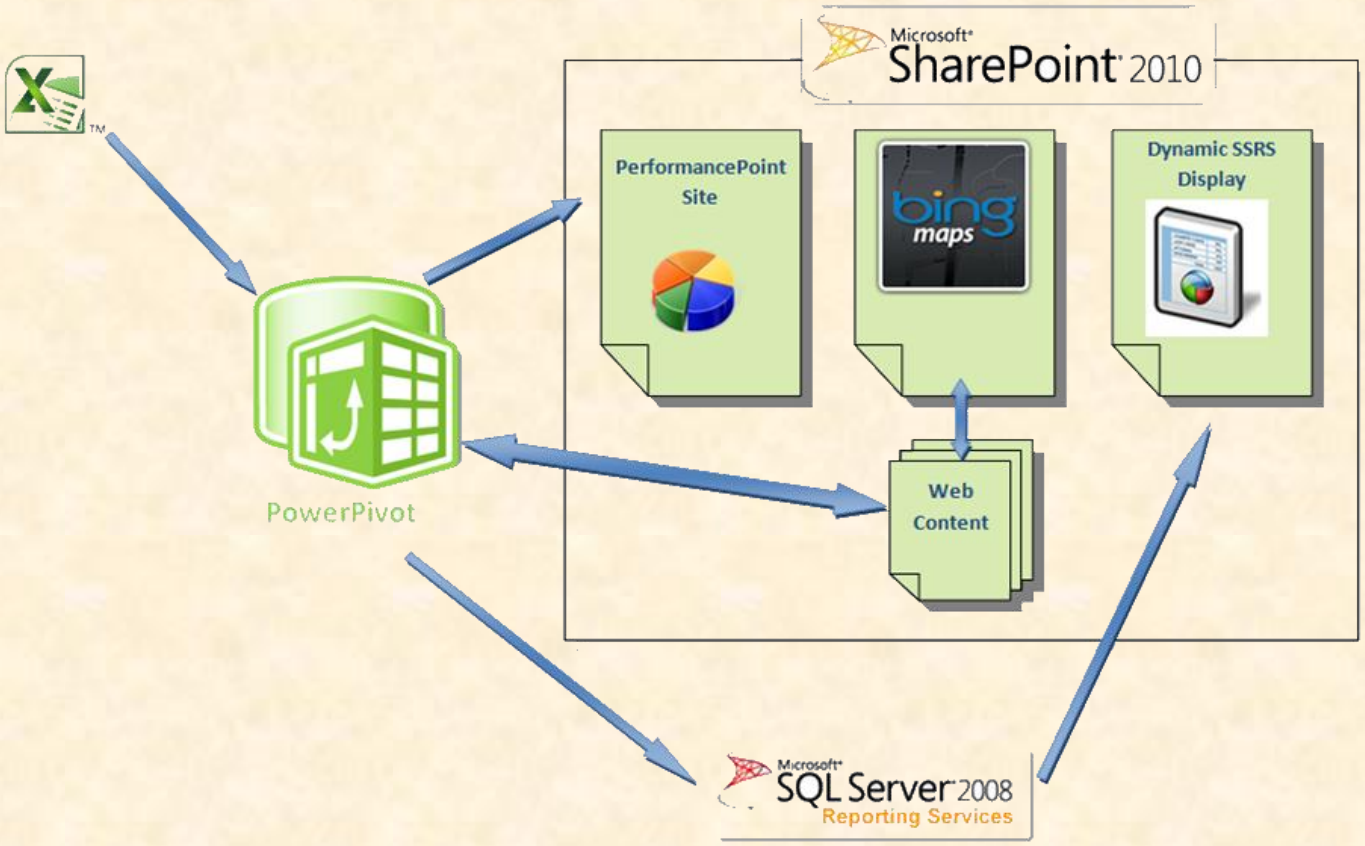
- Boeing
  - HTML5
  - JavaScript and JSON (JavaScript Object Notation)
  - Blender (3D Modeling)
  - OpenGL and WebGL
  - DIS (Distributed Interactive Simulation) and WebSockets
- Google
  - Java
  - Android SDK
  - Google App Engine
  - Google Chart Tools
  - Google Protocol Buffers
- Whirlpool
  - CSS, HTML
  - PHP or .NET
  - JavaScript, JSON (JavaScript Object Notation)
  - Java
  - Microsoft SQL Server
  - RESTful Web Services

Probably Not Understandable by End User

System Architecture Example



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

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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

(1 of 4)

- 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.
    - Get agreement with client.
    - Include as first part of project plan.
  - Do design specifications.
    - Get agreement with client.
    - Include as 2nd part of project plan.
  - Do technical specifications.
    - Get agreement with client.
    - 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

(2 of 4)

- Approach
  - Make Skeleton Document Immediately
    - Will Get You Organized and Focused
    - Include "Under Construction" Sections (Totally Empty)
  - Develop In Parallel When Possible But…
    - Complete Functional First
    - Complete Design Second
    - Complete Technical Third
  - Refine As Needed
  - Assign Sections to Team Members
  - Share with Client
    - Ask For (Specific) Feedback ← "Is this what you had in mind?"
    - Highlight What's New
    - Tricky Balance
      - ❖ Not Enough?
      - ❖ Too Much?

How To's (3 of 4)

- Schedule
  - Dictated by Course
  - See Major Milestones
    - 09/12: Status Report Presentations
    - 09/17: Project Plan Presentations
    - 10/15: Alpha Presentations
    - 11/05: Beta Presentations
    - 12/03: Project Videos
    - 12/05: All Deliverables
    - 12/06: Design Day Setup
    - 12/07: Design Day
  - 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

(4 of 4)

- "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
    - Operating Systems
    - Programming Languages and Environments
    - Web Technologies
    - Etc…
  - Legacy
- Milestones
- Etc…

(You may explore and propose other ideas.)

Nota Bene: Project Plan

- 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
  - Noon, Monday, September 17
  - Less Than 2 Weeks Panic!
- In Class Formal Presentations
  - September 17 – September 26
  - PowerPoint Template Provided

Resources on the Web

- Other Links > Downloads
  - Team Auto-Owners
  - Team Meijer
  - Team Spectrum Health
- Other Links > Online Resources
  - W3 Schools
  - iPhone Programming
  - Apache Subversion
  - Etc…
- High Resolution Sponsor Logo

  www.capstone.cse.msu.edu/2012-08/projects/<sponsor>/images/originals/sponsor-logo.png
  www.capstone.cse.msu.edu/2012-08/projects/auto-owners/images/originals/sponsor-logo.png

Project Plan

✓Functional Specifications

✓Design Specifications

✓Technical Specifications

- Risks
- Prototypes
- Schedule

} Future Meetings

What's ahead?

- Team Photos
  - Informal: After Meeting Today
  - Formal: After Each Project Plan Presentation
- Setup
  - Team Machines
    - Dell Server (Ask Meredith)
    - Apple iMac, MacBook Pro
  - Team Software
    - Web Server
    - Code Repository
    - SDK's
    - Etc.
- Think About Team Status Report

What's ahead?

- Team Status Report Presentations
  - PowerPoint Template
  - Due Midnight, Tuesday, September 11
  - Email to Dr. D.
    - Subject: Team <Company Name>: Status Report
      Subject: Team Auto-Owners: Status Report
    - Attachment: team-<company-name>-status-report-presentation.ppt
      Attachment: team-urban-science-statue-report-presentation.ppt
- Dr. D. Will Combine Into Single PowerPoint
  - To Speed Things Up During Meeting
  - Do NOT Modify Master Slide Page
- Each Team Presents
  - Using Dr. D.'s Laptop
  - At Most 5 Minutes (Rehearse Timing)
  - Single or Multiple Presenters (Your Choice)

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09/10: Risks and Prototypes

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