2. Technical Specifications

Technical Specification
- Written Document
- Describes
  - The “Problem”
  - Your Proposed Solution
- Complete
  - Functionally
  - Design-Wise
  - Technically
- “Only” Thing Left To Do Is “Programming”
- (Ideally) Could Be Used for Out-Sourcing
- (AKA, Architecture Document,...)

Not a Technical Specification
- Problem
  - Plane A leaves Los Angeles for New York traveling at 500 MPH.
  - At the same time, plane B leaves New York for Los Angeles traveling at 650 MPH.
  - How long will it take them to meet?
- Not a Technical Specification
  - Setup the appropriate algebraic equations involving distance, speed, and time.
  - Solve for time.

Design Process Overview
1. Functional Specifications
2. Design Specifications
3. Technical Specifications

Functional Specifications
- What does this do? (Not “how” does it do it?)
- 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

Technical Specifications
- Functional Specifications
- Design Specifications
- Technical Specifications
Building a House (1 of 4)

Functional Specifications
- 4 Bedrooms
- 2.5 Bathrooms
- Study
- 2-Car Garage
- Walk-Out Basement
(Note: Understandable by “User”)

Functionally, what else might you like to know?

Building a House (2 of 4)

Functional Specifications Refined
- ~ 2,500 sq. ft.
- $275,000 - $325,000
- 4 Bedrooms
- 2.5 Bathrooms
- Formal Living Room and Family Room
- Study
- 2-Car Garage
- Walk-Out Basement

What do you need to know next?

Interactions With Your Client

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

Technical Specifications
- Functional Specifications
- Design Specifications
- Technical Specifications

Design Specification
- Written Document
- Includes
  - 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

Building a House (3 of 4)

Design Specifications
- Mission Style, Stone Front
- Lots of Light
- Kitchen Connected to Family Room
- Master Bedroom on Main Floor
- Cathedral Ceilings
- Granite Counter Tops
- Etc...
(Note: Understandable by “User”)

What else will you need to know to build the house?
2. Technical Specifications

Screen Mock-Ups
- User Interface Only
  - Shows Layout, Buttons, Pull-Downs, Etc…
  - Non-Functional
  - No Back End
- Helpful for Developing
  - Look-and-Feel
  - Use Cases
- “Use” with Clients
  - Show to Clients
  - Go Through Use Scenarios with Clients

Basketball Play Effectiveness
- Coaches Desired
  - Determine Effectiveness of Plays
  - Record All Plays with Result
  - Produce Report of Effectiveness
    - Each Play
      - # of Success / # of Attempts
- I Learned
  - Done After Game from DVR
  - Lots of Plays in Play Book
  - ~60-80 Plays Per Game
  - Plays Categorized
    - Early Offense 1,2 (E.g., Fast Breaks)
    - Offense 1,2 (E.g., Half Court Play)
    - Special Situations 1,2 (E.g., Out of Bounds)

Interactions With Your Client
Design Specifications
- Derived With/From Client
- Documented For Client
- Presented to Client
- Agreed Upon With Client
- Your Job to Capture the Client’s Intent!

Technical Specifications
- Written Document
  - Identifies All the Parts and Their Interactions
  - Everything a Developer Needs to Write the Code
  - Includes Things Like…
    - Functional Specifications
    - Design Specifications
    - Machine Architectures
    - Software Technologies
    - Production Environments
    - Development Environments
    - SDK’s (Software Development Kits)
    - Network Topology
    - Continued…
2. Technical Specifications

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Michigan State University

Technical Specification (2 of 2)

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

Building a House (4 of 4)

Technical Specifications

- 20 lb Asphalt Roof Shingles
- 2" x 6" Outside Walls
- R48 Blown Attic Insulation
- Cat5E Wiring
- Pre-Made Roof Trusses
- 12" Poured Concrete Foundation
- Etc...
(Note: Probably Not Understandable by “User”)

System Architecture Diagram

Basketball Play Effectiveness

- BPE Application
  - Visual Basic
  - Access
  - Windows XP Tablet PC

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

Architecture Constraints

- CPU Speed
  - PDA
  - Itanium Server
  - Mainframe
- Communication
  - Speed
    - GigE
    - Ethernet
    - 802.11bg
    - Dialup
  - Protocol
    - TCP/IP
    - InDA
    - POTS
- Etc…
- Topology
  - One Machine versus Multiple
  - Client/Server
  - Thin or Thick Clients
  - External Systems
- Device-Specific Parameters
  - PDA Display Size
  - Ink on TabletPC
- Legacy Support
- Etc…

Architecture Tradeoffs

- Complexity
  - Number of Technologies
  - Design Patterns vs. Execution Speed
  - Number of Tiers or Subsystems
- Fully-Custom, Semi-Custom, or Off-the-Shelf
  - Platform (OS, Servers, SDKs, ++)
  - Language and Compiler
  - Project Type Choice
- Appropriate Technology
  - Reusable Modules
  - Special-Purpose Languages
  - Community Support
- Tools and Process
  - How automated a process do you need?
  - How do you communicate designs? (UML, ORM, etc.)
Interactions With Your Client

Technical Specifications
• 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!

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 spec.
    • Get agreement with client.
    • Include as first part of technical spec.
  – Do design spec.
    • Get agreement.
    • Include as 2nd part of technical spec.
  – Do technical spec.
    • Get agreement.
    • Finish technical spec.
    • 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
    • Revise As Needed
  – Refine As Needed
    • Assign Sections to Team Members
    • Share with Client
    • Ask For (Specific) Feedback
    • Highlight What’s New
    • Trickly Balance
      – Not Enough?
      – Too Much?

How To’s (3 of 4)
• Schedule
  – Dictated by Course
  – See Meeting Agendas
  • 09/10 Team Progress Report
  • 09/17 Technical Specifications / Schedule
  • 10/08 Prototypes
  • 12/03 Project Video
  • 12/05 All Deliverables
  – Other Milestone By Educated Guesses
  – Track To It
  – Revisit Often
  – Delivery Slippage = Graduation Slippage

How To’s (4 of 4)
“Living Document”
Make Sure Your Tech Spec Has...
• Cover Page
• Title
• Table of Content
• Page Numbers
• Headers and Footers
• Etc...
(That is, make sure your spec 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: Tech Spec

- 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
  - September 17
  - Less Than 4 Weeks
- In Class Formal Presentations
  - September 17 – September 24
  - PowerPoint Template Provided

Resources on the Web

- By Peter Surna
  - How to Write Specifications Part 1
  - How to Write Specifications Part 2
  - Joke-A-Day Web Site – A Sample Design Specification
  - www.yart.com
- CSE498 Web Site Downloads
  - Motorola
  - Union Pacific

Resources on the Web

- W3 Schools
  - Web Developer Resources
    - Tutorials
      - HTML
      - XML
      - Browser Scripting
      - Server Scripting
    - References
      - Examples
      - Quizzes
      - Quick Starters
    - Good
    - Free
- CSE498 Web Site Other Links

Technical Specifications

- Functional Specifications
- Design Specifications
- Technical Specifications

What’s next?

- Meet Team Members After Class
- Schedule
  - First Meeting ASAP
  - Schedule Weekly Team Meeting
  - Schedule Weekly Triage Meeting with Matt
- Select Client Contact Person
- Contact Client
- Setup
  - Team Machines
  - Team Website
- Think About Team Status Report

Client Contact

- Pick a Team Client Contact Today
- Send Email Immediately
- Send Contact Info for All Team Members
  - Email
  - Cell Phones
- Request
  - Contact Info for All Client Contacts
  - Time (in Next Day or So) for Meeting and/or Call
- On-Site Visit(s)
  - Do If Possible
  - Do Not Wait for On-Site to Get Started
Team # Status Report (1 of 4)

• Client Contact
  – Point 1
  – Point 2
• Team Meetings
  – Point 1
  – Point 2
• Team Organization
  – Point 1
  – Point 2

Team #: Team Name

Team # Status Report (2 of 4)

• Server Systems / Software
  – Point 1
  – Point 2
• Development Systems / Software
  – Point 1
  – Point 2
• Web Site
  – Point 1
  – Point 2

Team #: Team Name

Team # Status Report (3 of 4)

• Project Definition
  – Point 1
  – Point 2
  – Point 3
  – Point 4
• Technical Specification Document
  – Point 1
  – Point 2
  – Point 3
  – Point 4

Team #: Team Name

Team # Status Report (4 of 4)

• Risks
  – Risk 1
    • Description
    • Mitigation
  – Risk 2
    • Description
    • Mitigation
  – Risk 3
    • Description
    • Mitigation
  – Risk 4
    • Description
    • Mitigation

Team #: Team Name