MICHIGAN STATE
UNIVERSITY

2. Technical Specifications

CSE 498, Collaborative Design

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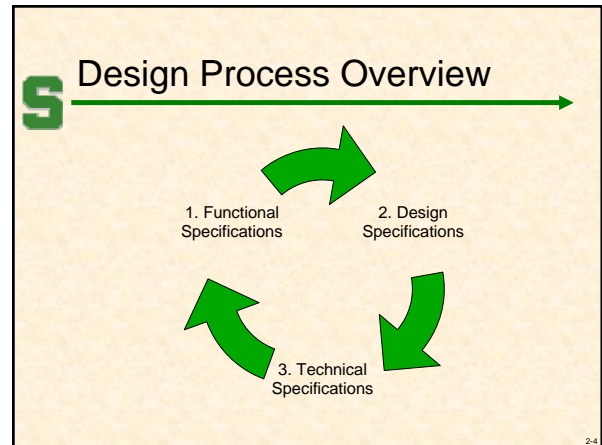
Fall 2006

Technical Specification

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

2-2

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.

2-3

Design Process Overview

1. Functional Specifications

2. Design Specifications

3. Technical Specifications

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Technical Specifications

⊠ Functional Specifications

☐ Design Specifications

☐ Technical Specifications

2-5

Functional Specifications

- Short List of Features
- Not Necessarily Complete
- Starting With
  - Shared Vision?
  - No Formal Documents?
  - Minimal Documents?
  - Incomplete Problem Statement?
- Understandable by User
- Initial Problem Statement
- Usually Refined

2-6

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?

2-7

Building a House (2 of 4)

Functional Specifications Refined
- ~ 2,500 sq. ft.
- $275,000 - $325,0000
- 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?

2-8

TWO MEN AND A TRUCK®

Create a system that…
- …allows field workers to complete and submit specified forms while performing a consultation.
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- …provides off-line access to pertinent franchise sales and performance information to be used during the consultation.

2-9

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!

2-10

Technical Specifications

☑ Functional Specifications

☒ Design Specifications

☐ Technical Specifications

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Design Specification

- Written Document
- Includes
  – Process Flow
  – Use Cases
  – Screen Mockups
  – Data Flow Diagrams
  – Data Organization
  – Etc…
- Identifies All the Parts and Their Interactions
- Understandable by User
- Usually Refined

2-12

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…

What else will you need to know to build the house?
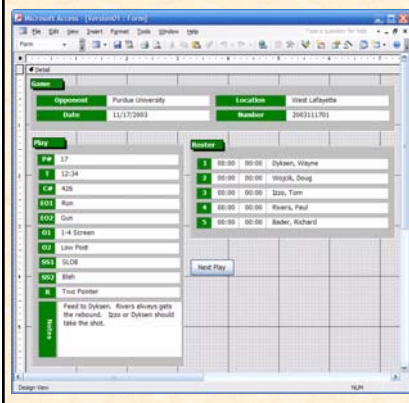
(Note: Understandable by "User")

2-13

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

2-14

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 Plays)
    - Special Situations 1,2 (E.g., Out of Bounds)

2-15

BB Stats Alpha V1

Fields
- P# Play Number
- T Time
- C#
- EO Early Offense
- O Offense
- SS Special Situations
- R Result

Nota Bene

- Just Screen Layout
- No Code (Underneath)
- Would **NOT** Have Entries in All Fields
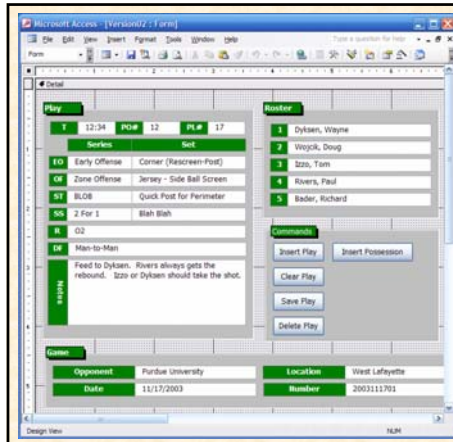
What I Learned From AV1 (1 of 2)

- Wanted to Identify Plays Within a Possession
- Plays Categorized Series / Set
  - Set is Variation on Series
  - E.g.
    - Series: Thumbs
    - Sets: Up, Down, Circle
    - Plays: Thumbs Up, Thumbs Down, Thumbs Circle
  - 1,2 Notation
    - EO1 = Early Offense Series
    - EO2 = Early Offense Set
  - ST (Special Teams) Missing

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What I Learned From AV1 (2 of 2)

- Results Coded
  - XN Missed N Pointer (X1, X2, X3)
  - ON Made 1 Pointer (O1, O2, O3)
  - FF   Foul on the Floor
  - TO   Time Out
  - Etc…
- Wanted to Record Notes on Defense
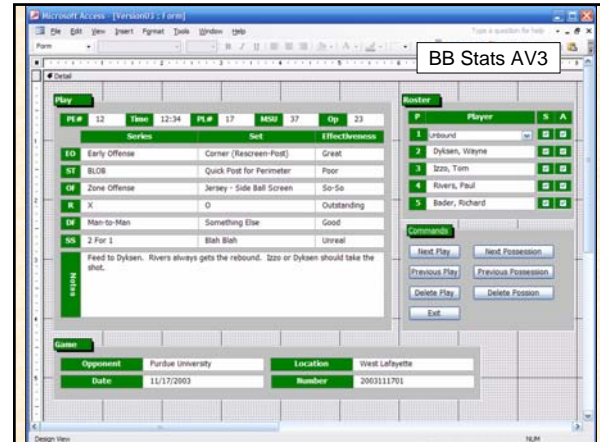- Didn't Care About Player Times
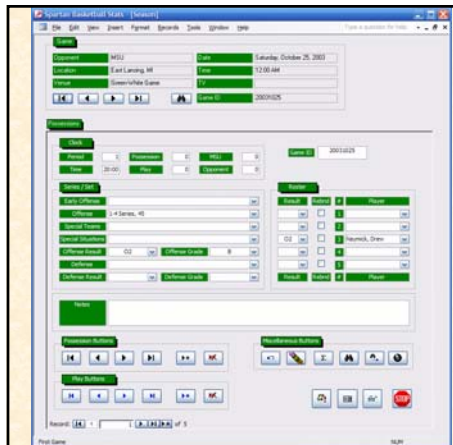
2-18

BB Stats AV2

Fields
- PO#
  Possession Number
- PL#
  Play Number
- SS
  Special Situations
- DF
  Defense

Nota Bene
- Just Screen Layout
- No Code
  (Underneath)
- Would **NOT** Have
  Entries in All Fields

BB Stats AV3

BB Stats
Beta 1

(First Version
With Code)

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Interactions With Your Client

Design Specifications

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Technical Specifications

☑ Functional Specifications

☑ Design Specifications

☒ Technical Specifications

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Technical Specification (1 of 2)

- 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…

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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 User
- Possibly Not Understandable by Client
- Usually Refined

2-26

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")

2-27

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

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Architecture Constraints

- CPU Speed
  - PDA
  - Itanium Server
  - Mainframe
- Communication
  - Speed
    - GigE
    - Ethernet
    - 802.11b/g
    - Dialup
  - Protocol
    - TCP/IP
    - IrDA
    - 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…

2-29

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.)

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Interactions With Your Client

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Cannot be emphasized enough!

2-32

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 practice, do all three in parallel.

2-33

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 ← Is this what you had in mind?
    - Tricky Balance
      - Not Enough?
      - Too Much?

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How To's (3 of 4)

- Schedule
  - Dictated by Course
  - See Meeting Agendas
    - 09/11 Team Progress Report
    - 09/18 Technical Specifications
    - 10/09 Prototypes
    - 12/04 Final Presentation
    - 12/12 All Deliverables Including Documentation
  - Other Milestone By Educated Guesses
  - Track To It
  - Revisit Often
  - Delivery Slippage = Graduation Slippage

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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.)

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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.)

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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 18
  - Less Than 4 Weeks
- In Class Formal Presentations
  - September 18 & 20
  - PowerPoint Template Provided

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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
  - Motorola
  - Union Pacific

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Technical Specifications

☑ Functional Specifications

☑ Design Specifications

☑ Technical Specifications

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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 09-11 Team Progress Report

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