MICHIGAN STATE
U N I V E R S I T Y

08/28: Capstone Overview

The Capstone Experience

Dr. Wayne Dyksen

Department of Computer Science and Engineering
Michigan State University

Fall 2013

From Students…
…to Professionals

Capstone Overview

➢Course Logistics

• Client Projects

• Course Logistics (Continued)

CSE 498, Collaborative Design

- "The Capstone Experience"
- Instructors
  - Dr. Wayne Dyksen ("Dr. D.")
  - Malcolm Doering
- Class Meetings
  MW, 3:00-3:50pm, 1225 EB
- Syllabus
- Web Site
  - capstone.cse.msu.edu
  - Check it often.

Course Goals

- Give You Experience
  - Real World (As Possible)
  - In Corporate Setting
- Help You Transition
  - From Student
  - To Professional

Course Goals

- Teams of Students
- Build Significant Software System
  - Design
  - Develop
  - Debug
  - Document
  - Deliver
- For Corporate Clients
- In 15 (Short) Weeks

Course Goals

- Build a Significant Software System

- Work in a Team Environment

- Learn New Tools and Environments

- Build and Administer Systems

- Develop Your Communication Skills

- Develop Interview Talking Points

- Etc…

Project Deliverables

- Project Plan Document & Presentation

- Alpha Presentation

- Beta Presentation

- Project Software & Documentation

- Project Video

- Design Day

See Major Milestones.

All-Hands Meetings

Presentations By

- Dr. D.
- Teams
  - Status Reports
  - Formal Presentations
    - Project Plan
    - Alpha
    - Beta
  - Project Videos
- Guest Speaker(s)

All-Hands Meeting Agendas

08/28: Capstone Overview

09/02: (Labor Day, No Meeting)

09/04: Project Plan

09/09: Risks and Prototypes

09/11: Team Status Report Presentations

09/16: Team Project Plan Presentations

09/18: Team Project Plan Presentations

09/23: Team Project Plan Presentations

09/25: Team Project Plan Presentations

09/30: Resume Writing and Interviewing

10/02: Career Gallery

10/07: Schedule and Teamwork

10/09: Creating and Giving Presentations

10/14: Team Alpha Presentations

10/16: Team Alpha Presentations

10/21: Team Alpha Presentations

10/23: Team Alpha Presentations

10:28: Design Day and the Project Videos

10/30: Camtasia Demo

11/04: Team Beta Presentations

11/06: Team Beta Presentations

11/11: Team Beta Presentations

11/13: Team Beta Presentations

11/18: Team Status Reports

11/20: Team Status Reports

11/25: Team Status Reports

11/27: Team Status Reports

12/02: Project Videos

12/04: Project Videos and All Deliverables

12/05: Design Day Setup

12/06: Design Day

12/12: Project Videos

Urban Science Capstone Lab

- 3352 EB
- Door Lock
  - Electronic Keypad
  - Code = ########
- Systems
  - Three PC's per Team
    - Dell Rack-Mounted Server
    - Two Development Machines
      - 27" iMac
      - 13" MacBook Pro
  - Team 100% Responsible
    - Building
    - Maintaining
    - Securing
    - Backing Up
- Books

- WiFi
  - SSID: CSE498
  - Key: ???????
- Conference Area
  - Team Meetings
  - Client Conference Calls
  - Google Conference Calendar
- Appliances
  - Water Cooler/Heater
  - Whirlpool Refrigerator
  - Microwave
  - Keurig Coffee Maker
- Lockable Storage
  - One Drawer Per Team
  - Assigned and Labeled
  - Obtain Keys from CSE Office

Scheduled Lab Times

- No Formal Lab Sessions
- "Credit" for Scheduled Weekly Meetings
  - Team Meetings
  - Client Conference Calls
  - Triage Meetings with Malcolm
- Meeting Times TBA With
  - Team
  - Client
  - Malcolm
- Students must be available to meet.

Capstone Overview

✓Course Logistics

➤Client Projects

• Course Logistics (Continued)

Team / Project Generalities

- Clients
  - Vary in Size and Type
  - Client contacts/mentors are "volunteers".
- Team Contact Person
  - Picked By Team
  - Main Point of Contact for Client

Team / Project Generalities

- Project Types
  - All Significant Software Development
  - Vary in Specifics
- Project Level of Difficulty
  - Hard Enough
  - But Not too Hard
- Deliverable
  - To the Client
  - By the Due Date

Team / Project Generalities

- Challenges
  - Very Short, Unforgiving Time Line
  - Client Contact
  - Team Dynamics
  - Project Plan (in Three Weeks)
  - Entirely New…
    - Languages
    - Environments
    - API's
    - SDK's
    - Processes
    - Protocols
    - Etc.
  - Project Management
  - Etc…

Project Specifics

- Vary
  - Type
  - Current State of Specificity
- Challenge
  - Connect with Client
  - "Nail Down" the Project
    - Hard Enough
    - Not too Hard
    - Avoid Feature Creep
  - Course Feature, Not Bug

Project Teams/Clients

- Team Auto-Owners
- Team Boeing
- Team GM
- Team IBM
- Team Meijer
- Team Mozilla
- Team MSUFCU
- Team Quicken Loans
- Team Spectrum Health
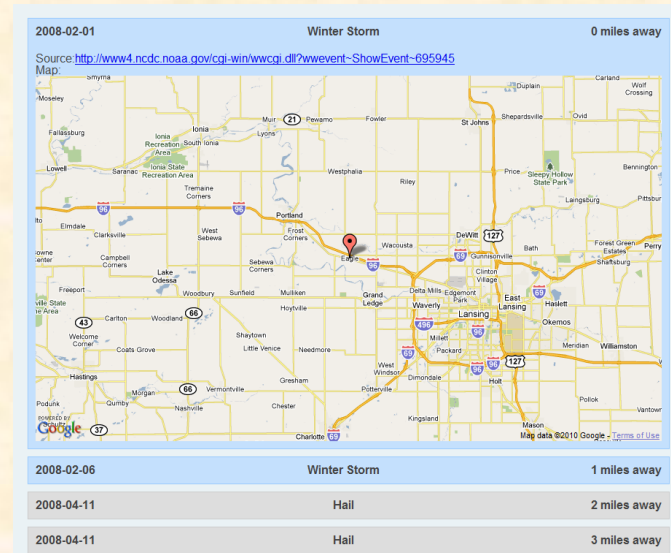- Team TechSmith
- Team Urban Science
- Team Whirlpool

Team Auto-Owners
Project Overview

Catastrophe Insurance Adjuster App

- Functionalities
  - Manage Independent Insurance Adjusters
  - Handling Claims Resulting from Catastrophes
    - Hurricanes
    - Tornados
    - Earthquakes
  - Remotely, At Site of Catastrophe
- Features
  - Handle Large Groups (Hundreds) of Adjusters
  - Assign Individual Adjuster to Claims
  - Map Locations of Adjusters and Claims
  - Show Historical Weather Data
  - Facilitate Two-Way Communications
- Technologies
  - CSS, HTML5
  - JavaScript, jQuery
  - Java
  - Microsoft SQL Server, DB2 or MySQL
  - Web Services
  - National Weather Service Storm Prediction Center
  - Capstone Weather Incident Verification System, Spring 2010

Auto-Owners Insurance
Life Home Car Business
The 'No Problem' People®

Lansing, Michigan

Team Boeing
Project Overview

Optimization of Boeing Assembly Lines

- Functionalities
  - Simulate Aircraft Assembly Line
  - Teams of Humans and Robots
  - Optimize Assembly Line Layout
- Features
  - 3-D Graphical Visualization
  - First Person View of Assembly Workers
  - Inverse Kinematic Algorithms
  - Quality Metrics
- Technologies
  - C++, Python
  - Gazebo
  - Pathfinding
  - Simulation (First Person View)
  - Networking
  - QT Application Framework
  - Optimization
  - 3-D Modeling
  - Capstone Paper Airplane Builder Game Simulator, Spring 2013

BOEING

St. Louis, Missouri

Team GM

Project Overview

Augmented Reality Auto Mobile Guide App

- Functionalities
  - Provide Information About a Particular Car
    - Make and Model
    - Manufacturer's Suggested Retail Price
    - Available Options
    - Location of Nearest Dealer
  - By Pointing Mobile Phone or Tablet Camera

- Features
  - Information Overlaid Over Car Image
  - Integrated with Social Media
  - Support both Apple iOS and Google Android
  - May Be Positioned as a Game

- Technologies
  - Apple iOS (iPhone and iPad)
  - Google Android (Phones and Tablets)
  - Argon Web Browser
  - ARToolKit
  - ATOMIC Authoring Tool
  - ArUco
  - IQ Engines
  - PAR Works

Detroit, Michigan

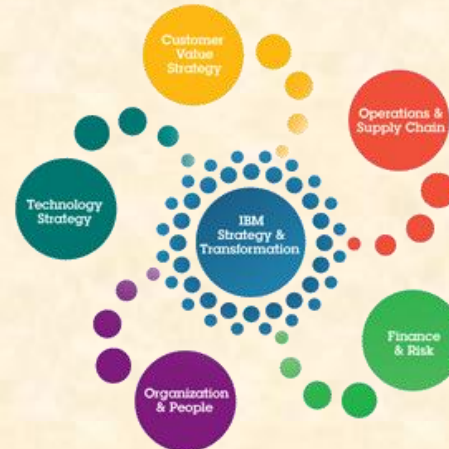# Team IBM
Project Overview

Information Technology Assessment Toolkit

- Functionalities
  - Toolkit for IBM Executive Consulting Services
  - Gather and Synthesize Client IT Information
  - Identify Potential Gaps
  - Prioritize Projects
- Features
  - Replace Existing Limited Spreadsheet Tools
  - Windows 7/8 Native Application
  - Consolidated Remote Database
  - Support Cross Client Analysis
- Technologies
  - Java, XML
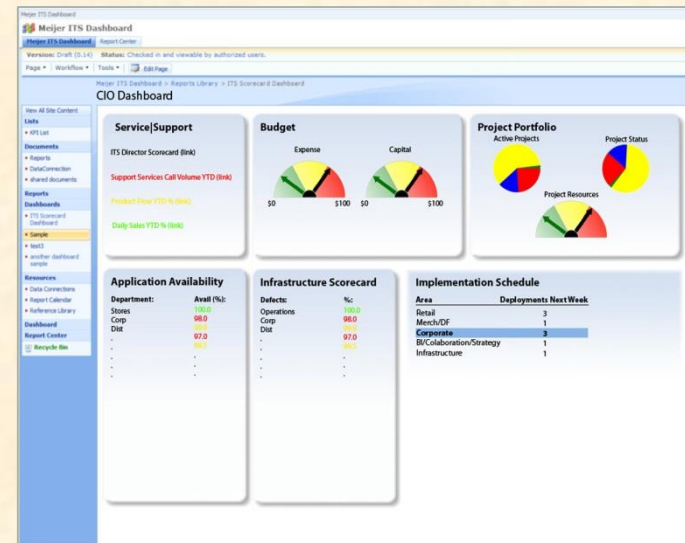 - IBM DB2 Database
  - Microsoft Windows Application Development

IBM
Armonk, New York

Team Meijer
Project Overview

Chief Information Officer Dashboard

- Functionalities
  - Dashboard of Information Technology Services (ITS) Key Performance Indicators (KPIs)
  - Targeted for Chief Information Officer (CIO) and ITS Leadership
  - Supports Desktop and Mobile Browsers
- Features
  - Spotlighting (Red/Green) of Actual vs. Goal
  - Trending: Up, Down and Rolling
  - Drill-down
  - Alerts and Notifications
  - Consistency of Delivery and Format
  - Extensible Architecture
- Technologies
  - C#, JavaScript
  - Microsoft Internet Information Services (IIS)
  - Microsoft SharePoint 2010
  - Microsoft SQL Server
  - Microsoft .NET
  - Capstone ITS Scorecard Dashboard, Fall 2009
  - Capstone Chief Information Officer Dashboard, Spring 2010
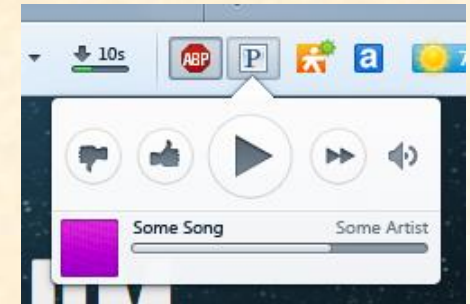

meijer

Grand Rapids, Michigan

Team Mozilla
Project Overview

Australis-Styled Widgets for Mozilla Firefox

- Functionalities
  - User Installable Widgets
  - For Completely Restyled Firefox
  - To Be Released End of 2013
- Features
  - Bugzilla
  - Weather
  - Music
- Technologies
  - CSS, HTML, JavaScript
  - XUL (XML User Interface Language)
  - Mozilla Firefox Add-On SDK
  - Web APIs for Bugzilla, Weather and Music
  - IRC (Internet Relay Chat)

mozilla
Firefox

Mountain View, California

Team MSUFCU
Project Overview

In-School Banking Program

- Functionalities
  - Enable Mini MSUFCU Branch
  - At Local Elementary and Middle Schools
  - Accept Deposits from Students
  - Run by Parent Volunteers
- Features
  - iPad App
  - Intuitive User Experience
  - Create and Manage Student Accounts
  - Transfer Information to MSUFCU
  - Secure
- Technologies
  - Apple iPad iOS
  - Objective C, Xcode, C#
  - CSS, HTML, PHP, JavaScript
  - Microsoft SQL Server, MySQL
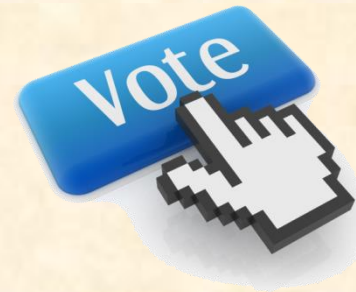 - Encryption Based on SQL Standards

MICHIGAN STATE UNIVERSITY®
FEDERAL CREDIT UNION
Building Dreams *Together*
East Lansing, Michigan

Team Quicken Loans
Project Overview

Survey and Voting Web Apps

- Functionalities
  - Collect Opinions and Feedback
  - Of Quicken Loan's Team Members
  - Via Online Surveys and Votes
- Features
  - Responsive Web App
  - Manage Surveys and Votes
    - Create and Send
    - Collect Results
  - Support Live Voting
  - Display Results Graphically
- Technologies
  - CSS, HTML5
  - Microsoft .NET
  - Microsoft Internet Information Services (IIS)
  - Microsoft Active Directory
  - Web Browser Plug-Ins

Quicken Loans
Engineered to **Amaze**
Detroit, Michigan

Team Spectrum Health
Project Overview

Talent Connections Careers Mobile Site

- Functionalities
  - Apply for Spectrum Health Position
  - Via Mobile Devices
  - Including Phones and Tablets
- Features
  - Simple and Easy Process
  - Web App, Consistent with Non-Mobile Site
  - Useable by Both Internal and External Candidates
  - Support for High Resolution Displays
- Technologies
  - CSS, HTML5
  - JavaScript, Ajax
  - jQuery, jQuery Mobile
  - Microsoft C#, ASP.NET MVC 4.0
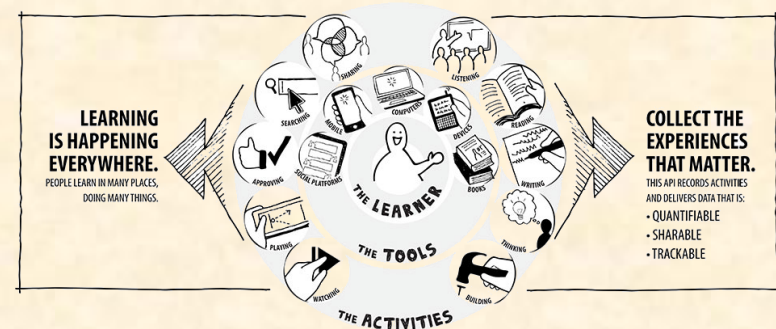 - Microsoft Internet Information Services (IIS) 7.0
  - RESTful Web Services

SPECTRUM HEALTH

Grand Rapids, Michigan

Team TechSmith
Project Overview

Learning Activity Capture

- Functionalities
  - Collect User Learning Activity Information
    - "Read an Article"
    - "Watched a Video"
    - "Took a Quiz"
    - Etc.
  - Summarize Information for User
- Features
  - Collect Information Via
    - TechSmith Smart Player
    - Web Browser Add-On
    - Microsoft User Interface Automation
  - User Provided Activity Hints
  - Shareable Activity Lists
  - Learning Activity Reporting Web Site
- Technologies
  - CSS, HTML5, JavaScript
  - Python, C#/.NET
  - Microsoft Windows and Ubuntu (Unix)
  - Advanced Distributed Learning, Learning Records Store
  - Tin Can API
  - RESTful Web Services
  - Microsoft Windows User Interface Automation

LEARNING IS HAPPENING EVERYWHERE.
PEOPLE LEARN IN MANY PLACES, DOING MANY THINGS.

COLLECT THE EXPERIENCES THAT MATTER.
THIS API RECORDS ACTIVITIES AND DELIVERS DATA THAT IS:
- QUANTIFIABLE
- SHARABLE
- TRACKABLE

THE LEARNER
THE TOOLS
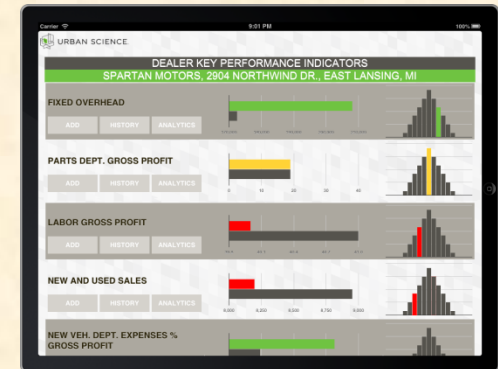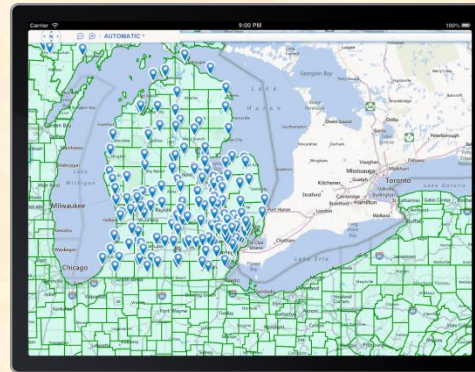THE ACTIVITIES

TechSmith®

Okemos, Michigan

Team Urban Science
Project Overview

Dealership Consultant Mobile Apps

- Functionalities
  - Support Urban Science Consultants
  - Meetings with Automobile Dealers
  - Provide and Collect Information
    - Before Meeting
    - During Meeting
    - After Meeting
  - Natively on iPad and Android Tablet
- Features
  - Useable During Meeting
  - Provide and Collect
    - Specific Action Plan
    - Dealer's Reaction
    - Meeting Atmosphere
    - Specific Process to be Utilized
    - Dealer Agreements
  - All Information Stored in SQL Database
- Technologies
  - Apple iOS iPad
  - Google Android Tablet
  - Microsoft Bing Maps or Google Maps
  - Web Services
  - SQL Server
  - Capstone Mobile Geography Management, Fall 2012
  - Capstone Dealership Consultant Mobile App, Spring 2013
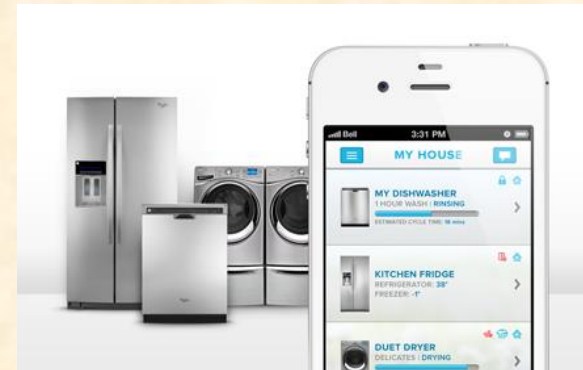

URBAN SCIENCE

Detroit, Michigan

Team Whirlpool
Project Overview

Connected Appliance SmartZones

- Functionalities
  - Extend Whirlpool Connected Appliance Feature
  - Enable Consumer Interaction Using SmartZones
  - Mobile Apps

- Features
  - Native Apple iPad and Google Android Tablet Apps
  - Use Geolocation and Geofencing
  - Support Various SmartZones
    - Vacation
    - Comfort
    - AlertMe
    - RemindMe

- Technologies
  - Apple iOS 6.x or Higher
  - Android Jelly Bean 4.2 or Higher
  - PhoneGap (Optional)
  - Mapping APIs (for Showing Locations of Geofenced SmartZones)
  - Whirlpool Connected Appliance APIs

Whirlpool CORPORATION

Benton Harbor, Michigan

First Assignments

- Read the Syllabus.
- Check out the Lab (3352 EB).
  - See if you can find it.
  - See if you can get in.
- Check out the Web Site.
- Research your Project.
  - Client
  - Technologies

What's Next?

- Teams
  - Assignments by Email Tonight
  - Meet Initially by Tomorrow Afternoon
  - Lab Machine Assignments in Lab
  - Start Configuring Lab Machines
  - Team Photos
    - Wednesday 09/04, After All-Hands Meeting
    - Dress Casual (But Appropriate)
- Client
  - Contact by Email by Tomorrow COB
  - Conference Call by Phone by Friday or Tuesday
  - Review Project Proposal

Capstone Overview

✓ Course Logistics

✓ Client Projects

➢ Course Logistics (Continued)

Urban Science Capstone Lab Machines

- Three Per Team
  - Rack-Mounted Dell Server
    - Connected to the Outside World
    - Keep Secure
  - 27" iMac
  - 13" MacBook Pro
- Operating Systems on iMacs and MBPs
  - Run OSX
  - Install VMware Fusion (from here)
  - Create Virtual Machines As Needed
    - Windows XP, Vista, 7, 8
    - Linux

Urban Science Capstone Lab Miscellany

- Security
  - Keep Lab Doors Closed
  - Do Not Open Doors For Strangers
  - Email Dr. D. if Door Becomes Unlocked
- Wireless
  - SSID: CSE498
  - Key: ??????
- Coffee
  - Some Provided by Dr. D.
  - Bed, Bath & Beyond (Get 20% Off Coupon)
- Game Playing
  - Not On Monitors Facing Hallway
  - Not If Other Team Members Need Machine

Expectations & Workload

- Extremely High For Both

- Your MSU Career Capstone

- Addition to Your Personal Portfolio

- Experience Viewed Like an Internship

- Interview Talking Points

- Leverage Into a Job Offer

Major Milestones

- 09/11: Status Report Presentations

- 09/16: Project Plan Presentations

- 10/14: Alpha Presentations

- 11/11: Beta Presentations

- 12/02: Project Videos

- 12/04: All Deliverables

- 12/05: Design Day Setup

- 12/06: Design Day

Meeting Attendance

- Required
  - All-Hands (Class) Meetings
  - Team Triage Meetings
- 5% of Final Grade
- Late == Absent
- Almost No Excuses Accepted
  - One or Two Excused Possible for Interviews
  - Must Provide Information In Advance
    (Date, Company, Recruiter Name & Contact Info)
- Must Attend (No Excuses Accepted)
  - Your Team Presentations
  - All Project Video Viewing
  - Design Day

Do NOT Schedule Interviews
Do NOT Schedule ANYTHING
Do NOT Buy Plane Tickets

Team Organization

- Up to Each Team

- Organize into Roles
  - Client Contact
  - Program Manager
  - Developer
  - Tester
  - Systems Administrator
  - Etc…

- Everyone Must Make Technical Contributions

Team Dynamics

- Key to Success

- Significant Component of Course Grade

- Address Problems Immediately

  - Within Team

  - With Dr. D. and/or Malcolm

- Be Ready to Discuss During Interviews

Grading

- Team (70%)
  - Project Plan Document & Presentation   10
  - Alpha Presentation   10
  - Beta Presentation   10
  - Project Video   10
  - Project Software & Documentation   25
  - Design Day   <u>05</u>
  - Total   70
- Individual (30%)
  - Technical Contribution   10
  - Team Contribution   10
  - Team Evaluation   05
  - Meeting Attendance   <u>05</u>
  - Total   30

Grading

- Final Grade Sum Of...
  - Individual Total
  - % of Team Total Based on Team Contribution
- Grand Total =

  (Individual Total)

  +

  (Team Total) * (Team Contribution) / 10.0

- *Nota Bene*: Your Team Contribution will have a very significant effect on your final grade.

Grading

- We reserve the right to make changes with sufficient notice.
- No special consideration will be given for final grades including but not limited to
  - status in any academic program including CSE,
  - financial aid,
  - rank in the armed forces,
  - job,
  - graduation,
  - mortgage,
  - wedding,
  - visa status,
  - or anything else.

Integrity of Scholarship

- MSU's policies will be enforced.

- Individual and team work must be original.

- Violators...
  - ...will be referred to the appropriate deans.
  - ...may receive a grade of F in the course.

IP & NDA's

- IP: Intellectual Property
  - By Default, Owned by You
  - Client May Request
    - Right to Use
    - Assignment of Ownership
    - Etc.
- NDA: Non-Disclosure Agreement
  - May Be Required by Client
  - You will…
    - …respect/protect intellectual property.
    - …respect/protect source code.
    - …etc.
- Normally Not an Issue
- Always Contact Dr. D. Before Signing Anything

Using Resources

- Ok For "Help"
  - People
    - Past Capstone Teams
    - Other Capstone Teams
    - Faculty Members
  - Articles
  - Sample Code
  - Etc...
- Not Ok For "Entire" Project
- If Unsure, Ask Dr. D. and/or Malcolm

Using Existing Code

- Ok
  - Examples
  - Prototypes
  - Open Source Code
    - Fragments
    - Libraries
    - Utilities
- Not Ok
  - Vast Amounts of Your Project
  - Not Open Source
- Ask Client in Advance
- Document and Report All Existing Code Used
- Be Careful!
- If Unsure, Ask Dr. D. and/or Malcolm

Design Day

- College of Engineering Event
  - Engineering Building
  - Friday, December 6, 2013
- Displays (Booths) of Design Projects
  - CSE Capstone
  - ECE Capstone
  - ME Capstone
  - Etc…
- Presentations and Awards
  - Panel of Judges
  - CSE Team Project Videos

VISA

- Verified Individualized Services and Accommodations

- Let us know immediately.

- We will work with you.

Office Hours

- Any Time...
  - Visit: 3149 EB
  - Call: 353-5573
  - Email: (dyksen@cse.msu.edu)
- Make Appointment

Capstone Overview

✓ Course Logistics

✓ Client Projects

Questions?

✓ Course Logistics (Continued)