09/14: Risks and Prototypes

The Capstone Experience

Dr. Wayne Dyksen
Department of Computer Science and Engineering
Michigan State University
Fall 2020
Meeting Attendance Notes

- **Microsoft Teams**
  - Joined ≤ 10:20:00 AM ⇒ On Time
  - 10:20:01 AM ≤ Joined ≤ 10:25:00 AM ⇒ Late
  - 10:25:01 AM ≤ Joined ⇒ Absent
  - Left ≤ Meeting End Time ⇒ Absent

- **Google Form**
  - Random Times During Meeting
  - Once At End of Meeting

- **Meeting End Time**
  - Normally ≤ 11:40:00 AM
  - Not Until “Dismissed”
  - Dr. D./TA May Dismiss Folks and Stay for Questions

- **Grade Impact**
  - On Time ⇒ -0.0
  - Late ⇒ -0.5
  - Absent ⇒ -1.0
  - Miss Google Form ⇒ ???

Still Considering

Subject to Change
Risks and Prototypes

➢ Risks

• Prototypes
Identifying Risks

• What You Don’t
  ▪ Know
  ▪ Understand
  ▪ Know How to Do

• Normally
  ▪ Major Project Features
  ▪ “Showstoppers”

• Varies From
  ▪ Not Familiar With But (Probably) Can Learn to
  ▪ Absolutely No Idea How to Do It

What are you worried about?
What should you be worried about?
Example Risks

Including but not limited to...

• Business Processes
• Key Application Features
• Hardware Systems
• Software Systems
• Development / Programming Environments
• Programming Languages
• Etc...
Prioritizing Risks

- **Classify Difficulty**
  - High: Very Hard, No Idea How to Do
  - Medium
  - Low: Not Hard, Probably Doable

- **Classify Importance**
  - High: Showstopper, Must Have
  - Medium
  - Low: Not Vital, Nice to Have
Prioritizing Risks

The Capstone Experience
Risks and Prototypes
Case Studies: Basketball Apps

• Play Effectiveness
  ▪ Determine Effectiveness of Plays
  ▪ Record All Plays with Results
  ▪ Produce Reports of Effectiveness

• Player Timer
  ▪ Keep Track of Player Times
  ▪ Record Minutes Played and Rested
  ▪ Use On the Bench, During the Game
Basketball Apps Architectures

Play Effectiveness Application

- Visual Basic
- MS Access
- Windows Desktop

Player Timer Application

- Visual Basic
- MS Access
- Windows Tablet PC

Basketball already had all three of these components.

I had some of these.
Basketball Apps Risks

• What SDK should I use?
• Can I write this in Visual Basic?
• How do I make a GUI in VB?
• How do I interface VB with Access?
  ▪ Create/Open/Save a Database?
  ▪ Read/Write Records?
  ▪ Traverse Records?
• How do I implement clocks in Windows?
  ▪ Game Clock?
  ▪ Wall Clock?
• How do I generate a report from Access?
Mitigating Risks

• Use Existing Resources
  ▪ Including But Not Limited To
    o Faculty
    o Other Students
    o Product Demos
    o Book Sample Code
    o Downloadable Examples
    o Wizards
    o Etc...
  ▪ Test Drive
    o Install
    o Compile
    o Extend
    o Etc...

• Build Prototypes
  ▪ Single Purpose
  ▪ Quick-and-Dirty

Nota Bene:
1. Check license if including in project.
3. Inform client.
Basketball Apps Risk Mitigation

• Game Clock
  ▪ Start /Stop
  ▪ Counts Down
  ▪ By Minutes:Seconds

• Handling Access Records
  ▪ Write Number
  ▪ Read Number
  ▪ Add Up Numbers
Risks and Prototypes

✓ Risks

➢ Prototypes
Aside: Capstone Transition

• From... “Make one of these.” –CSE Professor
  ▪ Coding
  ▪ Valuable Skills
• ...To “Solve my problem.” –Customer/Client
  ▪ Requirements Gathering
  ▪ Design
  ▪ Architecture
  ▪ Highly Valuable Skills
Prototypes

• Developed
  ▪ Early
  ▪ Rapidly
• Implement Subset of the Requirements
• Done for Variety of Reasons
• Are Not Finished Goods
• “Hacking” (Good Sense)
Why? Answer Questions

Help Determine...

• Specifications
  ▪ Functional
  ▪ Design
  ▪ Technical

• Usability

• How Existing Code Works

• Programming Languages

• Development Environments

• Operating Environments

• Etc...
Why? Determine Schedule

Determine how long it will take to...
• ...learn the new programming language.
• ...learn the development environment.
• ...learn the existing code.
• ...convert the existing code.
• ...convert the existing database.
• ...get libraries working.
• ...deploy the application onto an iOS device.
• ...Etc....
Why? Identify Risks

• Operability
  ▪ How do we make a game clock?
  ▪ Where do we store the data?

• Interoperability
  ▪ How does the game clock work with other tablets?
  ▪ How do the tablets all write to the same database?

• Scalability
  ▪ Will the game clock propagate in real time?
  ▪ Will the database engine keep up?

• Reliability
  ▪ What happens if the clock tablet dies?
  ▪ What happens if the database tablet dies?

• Etc-Ability...
Speed (to Write)

- Critical
- 2-3 Day Tasks
- Use Whatever Works
  - RAD Languages
  - SDK’s
  - IDE’s
  - Design Tools
  - Wizards
  - Sample Code
  - Etc...
- Stop When Questions Answered
Tradeoffs: Speed (to Write) vs...

• Speed (to Write) vs Best Software Practices
  ▪ Testing
  ▪ Documentation
  ▪ Security
  ▪ Software Engineering
  ▪ Usability
  ▪ Performance
  ▪ Coding Standards
  ▪ User Interface Standards
  ▪ Using Real Data
  ▪ Etc...

• Hence, May Not Be Appropriate in Final Deliverable
Challenge/Danger

- “Hack” Solution
  - It works.
  - It’s *a* way to do something.

  vs

- “Correct” Solution
  - It works.
  - It’s the *“right”* way to do something.
    (There may be more than one “right” way to do something.)

Often My Biggest Frustration
Basketball Prototypes Case Studies

➢ Play Effectiveness

• Player Timer
Basketball Play Effectiveness App

• Functional Specifications
  ▪ Determine Effectiveness of Plays
  ▪ Record All Plays with Results
  ▪ Produce Reports of Effectiveness
    ○ Each Play
    ○ # of Successes / # of Attempts

• Design Specifications?
• Technical Specifications?
Initial Meeting with Video Coordinator

I Learned...

• Done After Game
  ▪ On Desktop Computer
  ▪ From DVR-Like App

• Lots of Plays (~ 200) in Play Book

• ~20-40 Plays Run Per Game

• Plays Categorized
  ▪ Early Offense 1,2 (i.e., Fast Breaks)
  ▪ Offense 1,2 (i.e., Half Court Plays)
  ▪ Special Situations 1,2 (i.e., Out of Bounds)

• Overwhelming

Can you relate?
Play Effectiveness Architecture

Basketball already had all three of these components.
Risks

• Learning Basketball Business Processes
• Programming in Visual Basic
  ▪ Can this be done in VB?
  ▪ ! Can I learn VB?
• Making a GUI in VB
• Interfacing VB with Access
  ▪ Creating/Opening/Saving a Database
  ▪ Reading/Writing Records
  ▪ Traversing Records
• Generating Reports in Access
• Etc...
The Capstone Experience

Risks and Prototypes

BB PE PV1
(Prototype Version 1)
Fields
• P# Play Number
• T Time
• C# Clip Number
• EO Early Offense
• O Offense
• SS Special Situations
• R Result

Nota Bene
• Just Screen Layout
• No Code
(Underneath)
• Never Have All Entries Filled at Once

Feed to Adams. Washington always gets the rebound. Jefferson or Hamilton should take the shot.
What I Learned From PV1

• Wanted to Identify Plays Within a Possession
• Plays Categorized Series / Set
  ▪ Set is Variation on Series (“Parameterized Plays”)
  ▪ E.g.
    o Series: Thumbs
    o Sets: Up, Down, Circle
    o Plays: Thumbs Up, Thumbs Down, Thumbs Circle
    o CS Paradigm: Thumbs(Up), Thumbs(Down), Thumbs(Circle)
  ▪ 1, 2 Notation
    o EO1 = Early Offense Series
    o EO2 = Early Offense Set
  ▪ ST (Special Teams) Missing
What I Learned From PV1

- Results Coded
  - XN Missed N Pointer (X1, X2, X3)
  - ON Made N 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
  - Video Clip Number (C#)
### BB PE PV1

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

#### Nota Bene
- Just Screen Layout
- No Code
- Never Have All Entries Filled at Once

---

#### Game
- **Opponent**: Harvard University
- **Location**: Boston
- **Date**: July 4, 1776
- **Number**: 1776070401

#### Play
- **P#**: 48
- **T**: 12:34
- **C#**: 426
- **EO1**: Run
- **EO2**: Gun
- **O1**: 1-4 Screen
- **O2**: Low Post
- **SS1**: SLOB
- **SS2**: Blah
- **R**: Two Pointer

#### Notes
Feed to Adams. Washington always gets the rebound. Jefferson or Hamilton should take the shot.

---

#### Roster
<table>
<thead>
<tr>
<th>00:00</th>
<th>00:00</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>00:00</td>
<td>Adams, John</td>
</tr>
<tr>
<td>2</td>
<td>00:00</td>
<td>Jefferson, Tom</td>
</tr>
<tr>
<td>3</td>
<td>00:00</td>
<td>Washington, George</td>
</tr>
<tr>
<td>4</td>
<td>00:00</td>
<td>Franklin, Ben</td>
</tr>
<tr>
<td>5</td>
<td>00:00</td>
<td>Hamilton, Alex</td>
</tr>
</tbody>
</table>

---

**So, from this to...**
**BB PE PV2**

**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
**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

---

**Combined Series/Set**
- Eliminated Clip #
- Added Play #
- Eliminated Player Times
- Added Notes
- Added Buttons

<table>
<thead>
<tr>
<th>Play</th>
<th>Series</th>
<th>Set</th>
</tr>
</thead>
<tbody>
<tr>
<td>T</td>
<td>Early Offense</td>
<td>Corner (Rescreen-Post)</td>
</tr>
<tr>
<td>OF</td>
<td>Zone Defense</td>
<td>Jersey - Side Ball Screen</td>
</tr>
<tr>
<td>ST</td>
<td>BLOB</td>
<td>Quick Post for Perimeter</td>
</tr>
<tr>
<td>SS</td>
<td>2 F</td>
<td></td>
</tr>
<tr>
<td>R</td>
<td>02</td>
<td></td>
</tr>
<tr>
<td>DF</td>
<td>Man-to-Man</td>
<td></td>
</tr>
</tbody>
</table>

**Notes**
- Feed to Adams. Washington always gets the rebound. Jefferson or Hamilton should take the shot.

**Game**
- **Opponent**: Harvard University
- **Location**: Boston
- **Date**: July 4, 1776
- **Number**: 1776070401
What I Learned From PV2

- Wanted to Grade Effectiveness of Plays
- Wanted to Record Player Steals and Assists (Remember this...)
- Needed to Navigate Plays and Possessions
- Wanted to See Running Total Score
So, from this to...
### Play

<table>
<thead>
<tr>
<th>PE#</th>
<th>Time</th>
<th>PL#</th>
<th>MSU</th>
<th>Op</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>12:34</td>
<td>17</td>
<td>37</td>
<td>23</td>
</tr>
</tbody>
</table>

#### Series

<table>
<thead>
<tr>
<th>EO</th>
<th>Set</th>
<th>Effectiveness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early Offense</td>
<td>Corner (Rescreen-Post)</td>
<td>Great</td>
</tr>
<tr>
<td>ST</td>
<td>BLOB</td>
<td>Poor</td>
</tr>
<tr>
<td>OF</td>
<td>Zone Offense</td>
<td>So-So</td>
</tr>
<tr>
<td></td>
<td>O</td>
<td>Outstanding</td>
</tr>
<tr>
<td>DF</td>
<td>Man-to-Man</td>
<td>Good</td>
</tr>
<tr>
<td>SS</td>
<td>2 For 1</td>
<td>Unreal</td>
</tr>
</tbody>
</table>

#### Notes

Feed to Adams. Washington always gets the rebound. Jefferson or Hamilton should take the shot.

### Roster

1. Unbound
2. Jefferson, Tom
3. Washington, George
4. Franklin, Ben
5. Hamilton, Alex

### Commands

- Next Play
- Next Possession
- Previous Play
- Previous Possession
- Delete Play
- Delete Possession
- Exit

### Game

<table>
<thead>
<tr>
<th>Opponent</th>
<th>Location</th>
<th>Date</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Harvard University</td>
<td>Boston</td>
<td>11/17/2003</td>
<td>1776070401</td>
</tr>
</tbody>
</table>
BB PE PV3

Added Running Score

Added Steals and Assists

Added Effectiveness

Augmented Buttons

The Capstone Experience
Risks and Prototypes
What I Learned From PV3

• Wanted...
  ▪ Grades to Be A, B, C, D, F
  ▪ Results Associated With Players
  ▪ Series/Set Combined
    (“Thumbs Up” Rather Than “Thumbs”, “Up”)
  ▪ To Record Player Rebound

• Will be used by...
  ▪ Video Coordinator, GAs, and Managers
  ▪ Very Comfortable with DVR Controls

• Did NOT Want to Record Player Steals or Assists
<table>
<thead>
<tr>
<th>PE#</th>
<th>Time</th>
<th>PL#</th>
<th>MSU</th>
<th>Op</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>12:34</td>
<td>17</td>
<td>37</td>
<td>23</td>
</tr>
</tbody>
</table>

**Series**

- **EO**: Early Offense
- **ST**: BLOB
- **OF**: Zone Offense
- **R**: X
- **DF**: Man-to-Man
- **SS**: 2 For 1

**Set**

- Corner (Rescreen-Post)
- Quick Post for Perimeter
- Jersey - Side Ball Screen
- O
- Something Else
- Blah Blah

**Effectiveness**

- Great
- Poor
- So-So
- Outstanding
- Good
- Unreal

**Notes**

Feed to Adams. Washington always gets the rebound. Jefferson or Hamilton should take the shot.

**Roster**

1. Unbound
2. Jefferson, Tom
3. Washington, George
4. Franklin, Ben
5. Hamilton, Alex

**Commands**

- Next Play
- Next Possession
- Previous Play
- Previous Possession
- Delete Play
- Delete Possession
- Exit

**Game**

- **Opponent**: Harvard University
- **Location**: Boston
- **Date**: 11/17/2003
- **Number**: 1776070401

---

So, from this to...
BB PE AV1
(Alpha Version 1)
First Version With Code
Not Much Implemented
BB PE AV1
(Alpha Version 1)
First Version
With Code
Not Much Implemented
BB PE AV1
(Area Version 1)
First Version
With Code
Not Much Implemented

- Changed Grading to A, B, C, D, F
- Associated Results With Players
- Combined Series/Set
- Added Rebound
- Deleted Steals and Assists
- Changed Buttons to DVR-Style
What I Learned From Alpha 1

• Entering a Play
  ▪ Some Things Calculated Automatically
    o Play/Possession Number
    o Score
  ▪ Most Things Entered With Mouse Via Pull-Down Menus
    o Series / Set
    o Result
  ▪ But Time Entered With Keyboard Via Typing Numbers

• Need
  ▪ Mouse-Only Input
  ▪ Easy Way to Adjust Clock
BB PE AV1 (Alpha Version 1)
First Version With Code Not Much Implemented

So, from this to...
BB PE AV2

Still Not Much Implemented
BB PE AV2
Still Not Much Implemented

Added Clock Adjustment Buttons
BB PE AV2
Still Not Much Implemented
Basketball Prototypes Case Studies

✓ Play Effectiveness

➢ Player Timer
Player Timer App

• Keep Track of Player Times
• For Each Player Record
  ▪ Minutes Played
    o Game Clock Time
    o Consecutive & Total
  ▪ Minutes Rested
    o Wall Clock Time
    o Consecutive

• Must
  ▪ Be Usable on the Bench, During the Game
  ▪ Be Portable and Not Require Electrical Outlet
  ▪ Feel Like a Pen and a Clipboard
Player Timer App

Player Timer Application

Visual Basic

MS Access

Windows Tablet PC

I had some of these.
Risks

• Learning Basketball Processes
• Implementing Clocks in Windows?
  ▪ Game Clock
  ▪ Wall Clock
• Very Limited Screen Real Estate
  ▪ Different Problem Than Mobile App
  ▪ Must Feel Like Clipboard and Single Piece of Paper
• Computing and Displaying Cumulative Times
• Hidden Risk ("Danger Will Robinson!")
Player Timer Development

• Knew Exactly What They Wanted, So...
• Designed “Final” Version
  ▪ User Interface
  ▪ Data Base Schema
  ▪ Etc...
• Coded “Final” Version
• Bench Tested “Final” Version
• Field Tested “Final” Version
  ▪ In Practice Scrimmage
  ▪ Totally and Completely Unusable
• Scrapped “Final” Version UI and Started Over

Aside: Great Example of Front-End / Back-End Architecture and Design
Player Timer
Software Updates

- Enable Clock Adjustments (While Clock Stopped)
- Enable Check In/Out By Touching
  - Check In/Out Button
  - Player Name
  - Player Slot
- Allow > 5 Players Checked In (While Clock Stopped)
- Enable Pending Check In (While Clock Running)
- Eliminate All Modal Dialog Boxes
Basketball Prototypes Case Studies

✓ Play Effectiveness

✓ Player Timer
Risks and Prototypes

✓ Risk

✓ Prototypes
Questions?
What’s ahead?

- Team Photos
  - For Website and Design Day Booklet
  - Formal Team Photo.
  - Using Zoom (instead of Teams for Better Layout)
  - Screen Capture.
  - Dress is business casual.
  - TAs will make schedule.

- Apple Developer License
  - Request Invitation from James or Luke
  - Team Members are Members
  - James and Luke are Admins

- Illness Absences
  - From Meetings and/or From “Working”
  - Inform TA
  - Excused Illness Absence Requires Document
    - Signed by a Medical Doctor
    - Stating You Are Too Sick to Attend All-Hands Meeting and/or Do Work
What’s ahead?

• All-Hands Meetings
  ▪ 09/02: Capstone Overview
  ▪ 09/09: Capstone Overview
  ▪ 09/14: Risks and Prototypes
  ▪ 09/16: Team Status Report Presentations
  ▪ 09/21: Project Plan
  ▪ 09/23: Schedule and Teamwork
  ▪ 09/28: Team Project Plan Presentations
  ▪ 09/30: Team Project Plan Presentations
  ▪ 10/05: Team Project Plan Presentations
  ▪ 10/07: Team Project Plan Presentations
What’s ahead?

• Team Status Report Presentations
  ▪ PowerPoint Template
  ▪ Due 11:59 p.m. ET, Tuesday, September 15 ← Tomorrow Night
  ▪ Email to Dr. D.
    o Subject: Team [Team Name]: Status Report Presentation
      Subject: Team Auto-Owners: Status Report Presentation
    o Attachment: team-[team-name]-status-report-presentation.pptx
      Attachment: team-urban-science-status-report-presentation.pptx

• PowerPoint 365
  ▪ Microsoft Windows Version Required
  ▪ ! (Use Windows PowerPoint 365) ⇒ !(Processed Correctly)

• PowerPoint Slide Deck Submission Instructions
  ▪ Read Carefully
  ▪ File Name Conventions
    o All Lower Case
    o Replace Blanks with Dashes
    o Examples
      ❖ “Quicken Loans” → “quicken-loans”
      ❖ “team-[team-name]-status-report.pptx” → “team-quicken-loans-team-status-report.pptx”
  ▪ Submit to Dr. D. and your client by the deadline.
  ▪ ! (Submitted Correctly) ⇒ !(Processed Correctly)
What’s ahead?

• Split All-Hands Meetings
  ▪ Split by James’ and Luke’s Capstone Teams
  ▪ Two Public Microsoft Teams Channels
    o James Teams
    o Luke Teams

• Dr. D. Will Combine Team Slide Decks into Two Slide Decks By TA
  ▪ To Speed Things Up During Meeting
  ▪ Do NOT Modify Master Slide
  ▪ Must Use Windows Version of Microsoft Office 365

• Each Team Presents
  ▪ TA Will Be Microsoft Teams Presenter
  ▪ TA Will Share PowerPoint Slide Show (and “Drive”)
  ▪ At Most 4.5 Minutes (Rehearse Timing)
  ▪ Single or Multiple Team Speakers (Your Choice)
09/16: Status Report Presentation

Team [Team Name]

The Capstone Experience

Dr. Wayne Dyksen
Department of Computer Science and Engineering
Michigan State University
Fall 2020
Status Report Instructions

• Use the Microsoft Windows version of PowerPoint.
• Required Template
  ▪ Do not edit the master slides.
  ▪ Do not change the organization or number of slides.
  ▪ Make your presentation fit within these four slides.
• Content
  ▪ For the slide titles, replace [Team Name] with your company name as in “Team Auto-Owners” and [Project Title] by the project title posted online.
  ▪ All presentations will be posted on the course web site so do not include company confidential information or anything that your client would not want posted.
  ▪ Delete this slide from the presentation.
• Presenting
  ▪ The order of the presentations during our meeting will be team numerical order.
  ▪ The time limit for your presentation is 4.5 minutes, which will be strictly enforced. Practice your presentation to ensure that you will finish within the allotted time.
• Submission by Email ➡ Read this carefully.
  ▪ All presentations are due via email to me and to your client by 11:59 p.m., Tuesday, September 15. Send your presentation to your client in a separate email; do not cc me.
  ▪ For subject, use “Team [Team Name]: Status Report Presentation” as in “Team Urban Science: Status Report Presentation”.
  ▪ Attach the PowerPoint source file named “team-[team-name]-status-report-presentation.pptx” as in team-auto-owners-status-report-presentation.pptx. Use all lower case and replace blanks by dashes in your filename.
  ▪ Include some (professional) text in the body to avoid being sent to my junk folder and to practice being a professional.
Team [Team Name]
Status Report

[Project Title]
• Project Overview
  ▪ Description Point 1
  ▪ Description Point 2
  ▪ Description Point 3
  ▪ Description Point 4
• Project Plan Document
  ▪ Status Point 1
  ▪ Status Point 2
  ▪ Status Point 3
  ▪ Status Point 4

Status Information:
Think clicking “Status” on an Amazon order.
• You bought this on September 2. Helpful?
• We’re going to send this to you. Satisfied?
• People who bought this also bought…. We good?

What’s the *(%($*-ing status of my order?

Delete this textbox.

Include status information.
What’s the status of your project plan document?
Have you started it?
How much have you written?
What percentage complete is it?
Delete this textbox and the brace to the left.
Team [Team Name]

Status Report

[Project Title]

• Server Systems / Software
  ▪ Description &/or Status Point 1
  ▪ Description &/or Status Point 2
  ▪ Description &/or Status Point 3

• Development Systems / Software
  ▪ Description &/or Status Point 1
  ▪ Description &/or Status Point 2
  ▪ Description &/or Status Point 3

Include status information.

Are all systems up and running?

Have you tested everything?

Delete this textbox and the brace to the left.
Team [Team Name]

Status Report

[Project Title]

- Client Contact
  - Status Point 1
  - Status Point 2

- Team Meetings
  - Status Point 1
  - Status Point 2

- Team Organization
  - Description Point 1
  - Description Point 2

Include status information.

Who’s doing what?
Risks

- Risk 1
  - Description
  - Mitigation

- Risk 2
  - Description
  - Mitigation

- Risk 3
  - Description
  - Mitigation

- Risk 4
  - Description
  - Mitigation

List only “real” risks. For example, learning a new computer languages is **not** a risk for an MSU CSE student.

Give “useful” explanations of how you are going to mitigate each risk. For example, “we will learn how to do it” is **not** a useful explanation.

**Delete this textbox.**
Questions?
MICHIGAN STATE UNIVERSITY

VIRTUAL ENGINEERING EXCHANGE
SEPT, 11 - 18

COMPUTER SCIENCE + DATA SCIENCE ENGINEERING
THURS. SEPT. 17 | 4-7PM

SIGN UP IN HANDSHAKE TODAY!

CONNECT WITH 50+ COMPANIES

[Branding logos]
Evolutio

- Evolutio
  - AppDynamics Consultant to Fortune 500 Companies
  - Home Office in Chicago
  - Consultants work from home and on site.
- Recruiting CSE Seniors and Alumni
  - Two MSU Career Fairs
  - Handshake
- Many Open Interview Spots
  - Jordan Cobe (Holt, MI; Capstone Team Contact)
  - Bob Dyksen (St. Louis, MO; Dr. D.’s Son)
COVID Considerations Reprise

• Wear a mask.
  ▪ In Public Places Including Campus
  ▪ Cover your mouth and nose.
• Ensure social distancing.
• Wash your hands frequently.
• Carry and use hand sanitizer.
• Avoid “social gatherings.”
  ▪ Any and All
  ▪ Even 25 or Less People
• MSU’s Self-Quarantine Requirements
  ▪ For 14 days, Until 11:59 p.m. Saturday, September 26
  ▪ Violators may be suspended.