Unified - Systems and Labs
Requirements, Teamwork, Competition
Spring Semester 2004

SP2 Lecture
16.030-040 Unified Engineering

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Col. Pete Young

February 12, 2004
Lecture Overview

Importance of Requirements – Case Study Harrier

Teamwork

Project Management

Competition

SP2 and Team Assignments
Systems

- People
- Product
  - Hardware
  - Software
- Process
  - Procedures

U.S. Airways

McDonald's

AWACS

Global Positioning System

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Groups of people:
- Conceive
- Design
- Implement and
- Operate systems
Getting groups of people to:
  – Conceive
  – Design
  – Implement and
  – Operate

systems is...not easy
Systems Problem 1:

1.1 Formulate a Team Mission and Vision Statement
1.2 Create Team Management Plan
1.3 Minutes of Meeting #1
1.4 Agenda for Meeting #2
1.5 List of Action Items
When it’s good...

• When we started the project, our main goals (printed or not) were to complete the parts of the project the best we could in the time allowed. Winning the competition was certainly not a main goal. The finished product performed WAY beyond what we expected and we could not be more pleased.
When it’s good…

• I believe that as a team we worked extremely well together. We were tolerant with each other, always trying to maintain constructive criticism and respect each other’s opinion, in every situation. We learned to depend on each other very much and had to pull each other “out of the hole”…
When it’s bad…

• There were frustrating moments…The dynamic of my group when we sat together to do a System Problem did not work the way I like. Basically it was a disorganized meeting, with everybody giving ideas but without really reaching a consensus. We could spend 1 or 2 hours without doing any productive work…
When it’s bad…

• When we had to divide up the work on the design problems, it seemed like we all just did our stuff and attached it in one ugly mess to turn in…Another period of unorganization” was building the plane. We never knew exactly when we were going to meet….I guess that’s more of a problem of communication, though…
When it’s bad...

• Trying to get our group together to work on the plane/assignments earlier than the Thursday night before it was due. Nobody was willing to work on Friday night (especially me). Saturday’s were filled with other commitments people had such as sports, sleep, etc. Sunday, we worked on the Unified problem set, which took all of that day and Monday. Tuesdays were always shot because of a 16.070 problem set due the next day. Wednesdays were usually used to study for the usual Unified test on Thursday. This left Thursday nights to complete the entire assignment.
Keys to Success

Design
- Process
- Analysis

Tools:
- FRDIARRC

Project Mgmt
- Time
- Resources
- Risk

Tools:
- WBS
- Gantt Chart

Teamwork
- Communication
- Coordination
- Roles & Responsibilities
- Motivation!

Tools:
- Mission/Vision
- Management Plan
- Roles & Resp
- Effective Mtgs

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Mission Statement
• Describes current state
• Defines Purpose and Values

Vision Statement
• Describes a desired future state
• Measurable, actionable, and achievable goals

Clear, simple, precise language
Teamwork – Mission & Vision Statements

Pros
- Establishes framework for ethical behavior
- Defines performance standards
- Communicates common focus and goals

Cons
- Unrealistic goals
- Insufficient resources allocated to support plan
- “Business as usual” after introduction
- Lack of support and commitment

www.bain.com/bainweb/expertise/tools/mtt/mission_value.asp
www.libertysystems.net/missionandvisionworkshops.html
wi.essortment.com/writemissionvi_rvld.htm
Mission Statement

• To promote profitable employment opportunities for women, to empower them by enhancing their skills and improving their working conditions, and to provide employers with more alternatives to meet their labor needs by advocating for equitable employment standards, policies, and programs.

Vision Statement

• We will empower women to enhance their potential for securing more satisfying employment as they seek to balance their work-life needs.

http://www.dol.gov/wb
Expectations

• We expect from each member not only to put in the required amount of work each week but to follow through with what they say they will do, respect team members, and be able to trust each member of the team.

• We decided as a team that winning isn’t everything, we will give winning a fair shot, but do not expect to say up nights, and burn ourselves out in order to win.
Mission Statement

• We are a group of Unified Engineering students respectful of each other, committed to putting in our fair share of time on system problem assignments, and willing to follow through on our commitments.

Vision Statement

• We aspire to give winning a fair shot, but will not burn ourselves out in order to win.
Expectations-Mission/Vision?

• We decided we'd try doing without a "facilitator", "time-keeper", and "note-taker" for now and see how it goes. If meetings aren't being productive, we can always add them in later, but we don't think we'll need them for now.

• The main expectation/assumption we came up with was that everyone should show up on time to our meetings.
Teamwork – Management Plan

Roles & Responsibilities
- Who is doing what?
- Facilitator, note taker, pilot, integrator, team slacker?

Ground Rules
- How do we interact with each other?
- How are we going to treat each other?
- Any undisclosed assumptions about behavior?
- How would I like for you to communicate with me?
  - Roles decided at beginning of meeting
  - Be on time for arrival and breaks
  - Be prepared for discussion and decisions
  - Don’t shoot the messenger
  - Turn your cellular phone off
Ground Rules in Action

- Communication…

“You’re ugly.”
“I feel that you are communicating in an insulting manner.”
“Okay, I feel that you are ugly.”
“That’s much better.”
Teamwork – Management Plan

Communication Plan

• Where is everyone?
• How can I contact you?
• What is the best way to contact you?
• When are you available?
• How are we all going to keep in touch?
• Where is our project information going to be stored?
Effective Meetings

• Never meet without an agenda!
• If you are meeting w/o an agenda make one up first thing!
• Try facilitation.
• Assign facilitator, note taker, and timekeeper for every meeting.
• Rotate responsibilities!
• Keep it simple!!
Teamwork – Effective Meetings

Sample Agenda

- Assign facilitator, time keeper, note keeper.
- List everyone’s locations.
- List everyone’s contact information.
- Find out the best way to contact each team member.
- List team member expectations and assumptions.
- Decide how you are going to schedule second team meeting.
- Create second team meeting agenda.
- Adjourn.
Work Breakdown Structure

• Graphical tool for communicating and tracking project deliverables.

• Can sometimes be readily generated from strategy and functional requirements.

• Keep it simple!

• Blocks define what not how !!!
# McDonald's Systems

<table>
<thead>
<tr>
<th>Functional Requirements</th>
<th>Design Idea</th>
<th>Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Take orders</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cook burgers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deliver burgers</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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Project Management - WBS

Work Breakdown Structure

Serve 1 billion burgers

Order Taking
- People
- Product
- Service

Cooking
- People
- Product
- Service

Delivery
- People
- Product
- Service

McDonald's
## U.S. Airways Systems

<table>
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<tr>
<th>Functional Requirements</th>
<th>Design Idea</th>
<th>Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Take reservations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Give boarding passes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Put people on plane</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fly people long distance</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Work Breakdown Structure  U.S. Airways

Generate revenue by flying people many places
Then get bought out!

Reservations
• Tele-salespeople
• Sabre terminals
• Headsets
• Policies

Ticketing
• Ticketing Ctr Crew
• Sabre/USAir s/w
• Terminals
• Procedure: Cust ID?

Gate
• Gate crew
• Terminals
• Board by row

Flights
• Flight crew
• Food
• Headsets
• Buckle your belt!
<table>
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<tr>
<th>Functional Requirements</th>
<th>Design Idea</th>
<th>Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fly laps</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Load, carry, and don’t break egg</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Project Management - WBS

Work Breakdown Structure

Win Aerial Competition

Design
- Competition procedure
- Aircraft

Test & Training
- Pilot
- Pit crew
- Comp procedures

Build
- Wing & Tail
- Landing gear
- Egg holder

Unified Aerial Competition 2002

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**Gantt Chart**

- Popular tool for scheduling project deliverables
- Takes into account resources and constraints for delivery of project within timeframe and budget
- Can often be generated using information in WBS
### Gantt Chart

<table>
<thead>
<tr>
<th>ID</th>
<th>Task Name</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Take Order</td>
<td>1 day</td>
</tr>
<tr>
<td>2</td>
<td>Cook Burger</td>
<td>1 day</td>
</tr>
<tr>
<td>3</td>
<td>Deliver Burger</td>
<td>1 day</td>
</tr>
</tbody>
</table>

*Feb 11, '01*

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System Problems and Labs
2004 Requirements and Resources

- Develop a system to participate in an aerial competition
- System must be ready by 29 April 2004
- Endurance flight with operations and egg payload (1-4 eggs)
- Don’t crack or break egg during handling, loading, flight, landing
- 5 people, 9 weeks, 4hrs/person/week, kit, supplies, flight training
Team Assignments

- Pick up a team assignment sheet
- Faculty has assembled teams based on:
  - some elements of randomness
  - similar to industry, can’t always choose

- It is important that you have a first meeting soon