2.009 Product engineering processes

Are you creative?  
(check as appropriate)

Yes  ✔  No  

People who believe they are creative, are; people who don’t, aren't.

LED microfilm projector
“if you think you can do a thing or think you can't do a thing, either way you're right.”

Henry Ford
founder of Ford Motor Company, father of modern mass production
1863-1947
2.009 product engineering processes

last week

motivation

+ creativity

+ informed craft

+ process

project theme and context

idea generation strategies

typical PD milestones/structure
2.009 product engineering processes today

brainstorming milestone
project idea fair (tonight)
meetings
teams
teamwork challenge

informed craft
process
mini quiz!

One minute

write your name on the top of your index card

list 4 individual creativity strategies
strategy #1
look for the next right answer

strategy #2
look from multiple viewpoints

strategy #3
defer all judgments
tell the left side of your brain to be quiet

strategy #4
challenge assumptions
question assumed boundaries or norms
number of ideas in 5 minutes
improvement after instruction (Lincoln lab)
a quick question

I have been asked to plant 4 trees equidistant from each other

what about a hill?
Brainstorming deliverable
for lab this week

at least 20 project ideas in notebook, based on observation
you might be pleasantly surprised if you have many more
top 5 sketched on separate sheets

everything that follows depends on this!
optportunity/need inspiration, feasible, preliminary market research
Effort and results
Total hours spent by team vs. final outcome

![Graph showing the relationship between total number of hours spent on the project and final review results. The graph has a question mark to signify uncertainty or further investigation needed.]
Effort and results

Hours spent on ideation vs. final outcome

importance of rigor in breadth
Workflow

each stage builds on prior effort

Homework

For real

time

capacity

100%
Project timesheets

why in 2.009?

representative of real practice  
data for your business model

reflection on where/how  
you are spending your time  
no course staff will see your data!

improve the 2.009 product development process
Project timesheets

how they work

Edit 2.009 Timesheet Entry for David Wallace

<table>
<thead>
<tr>
<th>Date:</th>
<th>time alone</th>
<th>time w/others</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activities</td>
<td>hr</td>
<td>min</td>
</tr>
<tr>
<td>Designing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>identifying design problems</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>generating design concepts</td>
<td></td>
<td>30</td>
</tr>
<tr>
<td>selecting design concepts or details</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>sketching ideas</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>CAD modeling</td>
<td></td>
<td></td>
</tr>
<tr>
<td>writing about your project</td>
<td></td>
<td></td>
</tr>
<tr>
<td>analyzing or calculating</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

log in and start using the form

(MIT username. notebooks, scheduler, store, timesheets are all same password)

spreadsheet for offline note keeping

separate entry for each day
Project timesheets guidelines

do not over-bill or under-bill

be accurate and complete

fastest to make entries every day that you work on the class

your lab instructors and course instructors will not see your data. Scripts are used by a 3rd party to process the data (in bulk) after the term
Project idea fair
7 PM (sharp) to 8 PM tonight
Project idea fair

but first!

Pizza at 6:30 PM in Pappalardo
# Project idea fair

7 PM (sharp) to 8 PM tonight

conference with parallel sessions

**Schedule for the blue team**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:05-7:30 PM</td>
<td><strong>Helping Library Patrons</strong>&lt;br&gt;Alvaro Rivera&lt;br&gt;Amy Fang&lt;br&gt;Rachel O'Grady&lt;br&gt;Sam Ubellacker</td>
</tr>
<tr>
<td>7:35-8:00 PM</td>
<td><strong>Daily Operations at Mount Auburn</strong>&lt;br&gt;Ben Teitscheid&lt;br&gt;Carolynn Will&lt;br&gt;Loewen Cavill&lt;br&gt;Yazan Baara</td>
</tr>
<tr>
<td>7:05-7:30 PM</td>
<td><strong>Safety and Hazards of Stonework</strong>&lt;br&gt;Ben Teitscheid&lt;br&gt;Carolynn Will&lt;br&gt;Loewen Cavill&lt;br&gt;Yazan Baara</td>
</tr>
<tr>
<td>7:35-8:00 PM</td>
<td><strong>Caring for Animals in Shelters</strong>&lt;br&gt;Claire Traweek&lt;br&gt;Danny Wiest&lt;br&gt;Miranda Gong</td>
</tr>
</tbody>
</table>

use team mailing list to coordinate
use slack site/dropbox: Tutorial 4:00 today

if you cannot attend, please make sure your session is covered

be asking about opportunities
Project idea fair
7 PM (sharp) to 8 PM tonight

See ideas fair session link on homepage
Running meetings
the big picture

meeting ≠ chillaxin in a room around a big table

home page: of interest
a team is...?
more than a group

a group that is interdependent for overall performance

team!
why?

the need for teamwork grows with the challenge

none of us is as good as all of us

a good team!
meaningful purpose

clear performance goals

mailing lists
team slack site
notebooks
peer reviews
team reviews
milestone feedback
communication instructors
yoda

dream team

communication
well-defined work approach

meaningful purpose

clear performance goals

complementary skills

communication

mutual accountability

dream team
shared values

- well-defined work approach
- clear performance goals
- complementary skills
- communication
- meaningful purpose
- mutual accountability

dream team
most important team success factor

- Shared values
- Mutual trust (mutual accountability)
- Inspiring vision (meaningful purpose)
- Complementary skills
- Rewards

percent of respondents

Ten3 global internet polls
Teamwork
characteristics correlated with effectiveness

Positive:
taking the initiative
results orientation
attention to detail
clear guiding philosophy
  (e.g., meeting rules, team code of conduct)

Negative:
informality
high level of praise for performance

Hitt et. al. *The birth, life, and death of a cross functional new product design team*,
HF5415.2.M37 no. 96-111
Teamwork
design success factors

Positive:
effective communication (all team assets)
management support (system integrators, yoda, lab instructors)
involvement of all relevant parties (e.g., user feedback throughout)

Negative:
team members unable to see different viewpoints (strong mental set)
organizational politics

Teamwork challenge

team role-playing and problem solving

task
build the tallest free standing balloon structure

materials
144 balloons (in team color), 3 rolls packing tape,
3 tape dispensers, 3 pair scissors, pens and paper

where
outside, Killian court

deadline
1:50 PM during today’s class
Teamwork challenge
roles and rules

assemble your 2.009 team around the materials box
make sure you are with the right team
select a team manager
one team member wears the go pro (it’s on)
pick roles from envelope—keep confidential
all but team manager play assigned roles
do not tie balloons together
only use the materials provided
do not use chairs, ladders or climb objects to assemble structure
Teamwork challenge

reflection

at 1:50 PM
judging
gather for awards ceremony
pop your balloons
discuss your roles and how they impacted team performance
discuss ways that the team manager was effective
team photo/video
cleanup

start now!