ideate.
model.
test!
FNAP

Facts. Not assertions. Please!

the action of stating something or exercising authority confidently and forcefully.
YES

and
No because
No success factors
success factors
involved user or representative

success factors
shared team vision

success factors
realistic stretch goal

success factors
success factors
understanding the competition
frequent, realistic testing

success factors
success factors

open communication
success factors

working in Pappa!
factor negatively correlated with performance?
factor negatively correlated with team performance?
Lisa - Garden Enthusiast
FLEX SEAL CLEAR

rankings not a grade!
feedback received
feedback to be given
Please review the detailed instructions before completing this form.

2.009 Product Engineering Processes

Hello

Bonus: Allocated 0 / 2000 points

Ello

Bonus: Allocated 0 / 2000 points

Submit my peer review!
2.009
Product Engineering Processes

Please review the detailed instructions before completing this form.

Hello

Do More Do Less Keep Doing

Bonus: [ ] Allocated 0 / 2000 points

Ello

Do More Do Less Keep Doing

Bonus: [ ] Allocated 0 / 2000 points

Submit my peer review!
2.009
Product Engineering Processes

Please review the detailed instructions before completing this form.

Hello

Do More

Do Less

Keep Doing

Bonus:  Allocated 0 / 2000 points

Ello

Do More

Do Less

Keep Doing

Bonus:  Allocated 0 / 2000 points

Submit my peer review!
unconscious bias

gender, race, identity, age, culture, language, institution
## Recipe

**constructive, unbiased feedback**

<table>
<thead>
<tr>
<th>INGREDIENTS</th>
<th>DIRECTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
RECIPE
constructive, unbiased feedback

INGREDIENTS

situation

DIRECTIONS

Ned
Ted
constructive, unbiased feedback

**INGREDIENTS**

**situation**

**DIRECTIONS**

when and where
be specific
## Recipe

**Constructive, unbiased feedback**

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>Directions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Situation</strong></td>
<td><strong>When and where</strong></td>
</tr>
<tr>
<td><strong>Behavior</strong></td>
<td><strong>Be specific</strong></td>
</tr>
</tbody>
</table>
Recipe
constructive, unbiased feedback

Ingredients
situation
behavior

Directions
**Recipe**

**Constructive, unbiased feedback**

**Ingredients**

- Situation
- Behavior

**Directions**
RECIPE
constructive, unbiased feedback

INGREDIENTS

situation

behavior

DIRECTIONS
### Recipe for Constructive, Unbiased Feedback

**Ingredients**

- **situation**
- **behavior**

**Directions**

- **when and where**
- **be specific**
- **describe clearly and objectively**
- **focus on actions. Not personality**
## Recipe

**constructive, unbiased feedback**

<table>
<thead>
<tr>
<th>INGREDIENTS</th>
<th>DIRECTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>situation</strong></td>
<td>when and where</td>
</tr>
<tr>
<td><strong>behavior</strong></td>
<td>be specific</td>
</tr>
<tr>
<td><strong>impact</strong></td>
<td>describe clearly and objectively</td>
</tr>
<tr>
<td></td>
<td>focus on actions. Not personality</td>
</tr>
</tbody>
</table>
**Recipe**

Constructive, unbiased feedback

**Ingredients**

- Situation
- Behavior
- Impact

**Directions**
**Recipe**

constructive, unbiased feedback

**Ingredients**

situation

behavior

impact

**Directions**

describe clearly and objectively

focus on actions, not personality

be specific when and where
## Recipe
**Constructive, unbiased feedback**

<table>
<thead>
<tr>
<th>INGREDIENTS</th>
<th>DIRECTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Situation</strong></td>
<td>when and where</td>
</tr>
<tr>
<td><strong>Behavior</strong></td>
<td>be specific</td>
</tr>
<tr>
<td><strong>Impact</strong></td>
<td>describe clearly and objectively</td>
</tr>
<tr>
<td></td>
<td>focus on actions. Not personality</td>
</tr>
<tr>
<td></td>
<td>how were you affected?</td>
</tr>
<tr>
<td></td>
<td>how were others affected?</td>
</tr>
</tbody>
</table>
## Recipe for Constructive, Unbiased Feedback

### Ingredients

- **situation**
- **behavior**
- **impact**
- **next**

### Directions

- when and where
- be specific
- describe clearly and objectively
- focus on actions. Not personality
- how were you affected?
- how were others affected?
**Recipe**

**Constructive, unbiased feedback**

**INGREDIENTS**

- Situation
- Behavior
- Impact
- Next

**DIRECTIONS**

- Describe clearly and objectively
- Focus on actions, not personality
- Be specific
- How were you affected?
- How were others affected?
- Constructive, unbiased feedback
RECIPE
constructive, unbiased feedback

INGREDIENTS
situation
behavior
impact
next

DIRECTIONS

how were you affected?
how were others affected?

describe clearly and objectively
focus on actions. Not personality
be specific
when and where
**RECIPE**

constructive, unbiased feedback

**INGREDIENTS**

- situation
- behavior
- impact
- next

**DIRECTIONS**

how were you affected?

how were others affected?

describe clearly and objectively

focus on actions, not personality

be specific

when and where
recipe
constructive, unbiased feedback

ingredients
situation
behavior
impact
next
directions
**Recipe**

constructive, unbiased feedback

**Ingredients**

- **situation**
- **behavior**
- **impact**
- **next**

**Directions**

- when and where
- be specific
- describe clearly and objectively
- focus on actions. Not personality
- how were you affected?
- how were others affected?
- open a door to an improvement path
- suggestions for a do-over
# Recipe

Constructive, unbiased feedback

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>Directions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>situation</strong></td>
<td>when and where</td>
</tr>
<tr>
<td><strong>behavior</strong></td>
<td>be specific</td>
</tr>
<tr>
<td><strong>impact</strong></td>
<td>describe clearly and objectively</td>
</tr>
<tr>
<td><strong>next</strong></td>
<td>focus on actions. Not personality</td>
</tr>
<tr>
<td></td>
<td>how were you affected?</td>
</tr>
<tr>
<td></td>
<td>how were others affected?</td>
</tr>
<tr>
<td></td>
<td>open a door to an improvement path</td>
</tr>
<tr>
<td></td>
<td>suggestions for a do-over</td>
</tr>
</tbody>
</table>
**Process Sketch Model Review**

- **Three Ideas Presentation**: September 24, during class. 3 ideas per section.
- **Mockup Review**: October 21. 2 mockups per section.
- **Assembly Review**: November 1 & 3. 1 assembly.
- **Final Presentation**: December 6. 1 alpha prototype.

- **Sketch Model Review**: October 7. 3 models per section.
- **Final Selection**: October 26-28. 1 concept per team.
- **Technical Review**: November 15. 1 (almost) prototype.
Three ideas presentation
September 24, during class
3 ideas per section

Sketch model review
October 7
3 models per section

Final selection
October 26-28
1 concept per team

Technical review
November 15
1 (almost) prototype

Mockup review
October 21
2 mockups per section

Assembly review
November 1 & 3
1 assembly

Final presentation
December 6
1 alpha prototype

Process mockup review
Oct 21

Process mockup review

Petra
mockup

digital or physical
targeted models to realistically resolve
fundamental issues and risks associated with a concept
mockup

bench level prototypes
functional physical models

targeted
mockup

visual models

product definition and user feedback
mockup

ergonomic models

function of interfaces with human users!
### Analytical Models

- Spreadsheets
- Simulations
- Solid models
- Visual models
- Ergonomic models

### Analytical Models: Second Order Feasibility MFM

| A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R |
| 1 | User Mass | 75 kg | 165 lb | | | | | | | | | | | | | | | |
| 2 | Scooter Mass | 13.5 kg | 29.7 lb | | | | | | | | | | | | | | | |
| 3 | Total Mass | 88.5 kg | 194.7 lb | | | | | | | | | | | | | | | |
| 4 | Motor Constant | 0.0219 V-s/rad | 2.29 V-kilowatt/kgm | | | | | | | | | | | | | | | |
| 5 | Motor Resistance | 0.062 ohm | | | | | | | | | | | | | | | | |
| 6 | Motor Torque Damping | 3E-05 Nm/rad | | | | | | | | | | | | | | | | |
| 7 | Power Electronics Resistance | 0.040 mm | 10.04 ohms | | | | | | | | | | | | | | | |
| 8 | Battery Type | Lead Acid (Nickel) | | | | | | | | | | | | | | | | |
| 9 | Battery Specific Energy | 135 Wh/kg | 13 Wh/lb | | | | | | | | | | | | | | | |
| 10 | Battery Energy Cost | 0.005 V/kWh | 0.003 V/kWh | | | | | | | | | | | | | | | |
| 11 | Battery Recharge Efficiency | 80% | 1400 g/batt | | | | | | | | | | | | | | | |
| 12 | Wheel Diameter | 160 mm | 6.30 in | | | | | | | | | | | | | | | |
| 13 | Nominal Battery Voltage | 34 V | 6.74 V | | | | | | | | | | | | | | | |
| 14 | Total Battery Weight | 5.50 kg | 12.3 lbs | | | | | | | | | | | | | | | |
| 15 | Desired Average Speed | 5.6 m/s | 12.5 mph | | | | | | | | | | | | | | | |
mockup

Three ideas presentation
September 24, during class
3 ideas per section

Mockup review
October 21
2 mockups per section

Assembly review
November 1 & 3
1 assembly

Final presentation
December 6
1 alpha prototype

Sketch model review
October 7
3 models per section

Final selection
October 26-28
1 concept per team

Technical review
November 15
1 (almost) prototype
mockup

Three ideas presentation
September 24, during class
3 ideas per section

Mockup review
October 21
2 mockups per section

Assembly review
November 1 & 3
1 assembly

Sketch model review
October 7
3 models per section

Final selection
October 26-28
1 concept per team

Technical review
November 15
1 (almost) prototype

Final presentation
December 6
1 alpha prototype
mockup

review
mockup

part 1: presentation to class, 2 minutes/concept

part 2: model use in lab, 5 minutes/concept

part 3: demonstration recording, 2 minutes/concept
mockup

part 1: presentation to class, 2 minutes/concept
mockup

part 1: presentation to class, 2 minutes/concept
mockup

part 1: presentation to class, 2 minutes/concept
mockup

part 1: presentation to class, 2 minutes/concept

<table>
<thead>
<tr>
<th>user need</th>
<th>product attribute(s)</th>
<th>engineering specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>can be easily transported</td>
<td>weight</td>
<td>total weight less than 40 lbs</td>
</tr>
<tr>
<td>is easily stored in the home garage</td>
<td>size</td>
<td>less than 24” x 24” x 24” in smallest configuration</td>
</tr>
<tr>
<td>can handle most repair situations</td>
<td>lifting capability</td>
<td>more than lift 15 cycles for a 3000 lb automobile with external power</td>
</tr>
<tr>
<td>can be used on many uneven surfaces</td>
<td>stability</td>
<td>3000 lb vehicle raised 16 inches will not tip under 400 lb side loading</td>
</tr>
</tbody>
</table>
mockup

part 2: model use in lab, 5 minutes/concept
mockup

part 3: demonstration recording, 2 minutes/concept
mockup

part 3: demonstration recording, 2 minutes/concept

review 3
mockup

part 3: demonstration recording, 2 minutes/concept
nothing is particularly hard

if you divide it into small jobs

Henry Ford 1863-1947
developer of the assembly line