Sharing the Power of STEM

Michele Stuart, PMP
Scientist vs. Engineer

• Scientist
  – **See** how things work

• Engineer
  – **Make** things work

Turn Ideas into Reality!
Me!

Michele S. Stuart

- Project Management Professional (PMP)
- Professional Engineer (original license in Virginia in 1985)
- Double Master’s in Industrial Engineering and Operations Research
- Expert in Lean 6 Sigma
- Consulting Firm since 1994:

www.efficiencyengineers.com
My Influencers

• Father – Nuclear Engineer
• Math teachers in middle school
• Personal Traits
  – Always an organizer
  – Great at math and science
  – Puzzles, puzzles, puzzles…. 
My Life

- VA Tech 1975-79
- Master’s
- EIT/PE
- Lifestyle selections
- From employee to manager to owner
Career Pathway

- Manufacturing
- Europe and NATO
- Internal consultant for DC
- Family issues
- Efficiency Engineers
- Global Entrepreneur of the Year - SWE
- Teaching all along the way…. 
ENIAC Refrigerator Ladies
Current Status

- Women comprise only 9% of engineering faculty
- Undergraduate women total only 23.5% with little change over the past 15 years
- Yet – 70% of small businesses are owned by women
- AND, overall **only 20%** of adult population have problem solving skills!!
Lillian Gilbreth

Mother of Industrial Engineering
America’s First Lady of Engineering

• Born 1878, BS at Berkley in 1900
• MS in ME in 1902, married in 1904
• 12 children in 16 years while earning PhD
• Husband dies in 1924
• What was next for her?
What Makes Up Your Sneaker

- Inner sleeve provides breath-ability.
- "Mesh" material provides breathe-ability and flexibility.
- Interlocked mid-sole provides cushioning.
- Cushioning – insole & outsole
- Visible fabric web protects against bruising
- Outsole - aggressive traction lugs - for traction

Making the Connection
M. Cyr - Tufts University, CEO
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How Do Engineers Help?

- **BioMedical** - design to support the foot and make racers/basketball players better
- **Chemical** – chemicals for the soles
- **Mechanical** – equipment to make and test
- **Electrical** – controls the machines
- **Civil** – water & sewer facilities, roads to get people to work
Do YOU Know any Engineers?

- Family
- Friends
- TV Buddies??
Do you like to make things better?

• Do you like to watch things that work well?
• Does the line at the grocery store or McDonald’s make you crazy?
• Do you like to organize things?

You may be an Industrial Engineer!
Industrial Engineers

- Always looking for a better way
- Improve quality – make things better
- Increase productivity – get things done more easily
Why I like being an IE

• Valuable: Save money and make workplace better
• Flexible: Apply same principles to many areas
• “Change Engineers” - always looking for the better way to do things
• Work with people and processes
What I do as an IE

Are things arranged the best way? – Layout

What is the best order to do things? – Scheduling

What is the best way to do something? – Methods
The Problem

What would Lillian Gilbreth do with one bathroom and five kids to get off to school?
The Details

- Ann – 14, has to be sure every hair is in place, shows off on the way to school
- Bridget – 10, quick in the bathroom, fast walker
- Charlie – 12, just an average guy
- David – 8, only brushes his teeth, gets easily distracted on the way to school
- Emily - 6, likes the mirror, and her friends on the way to school
# Times

<table>
<thead>
<tr>
<th>Child</th>
<th>Time in Bathroom</th>
<th>Walking Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ann</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>Bridget</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Charlie</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>David</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>Emily</td>
<td>6</td>
<td>6</td>
</tr>
</tbody>
</table>
Objective

• What is important?

• What does “late” mean?
Assumptions

• Everyone finished breakfast at 8 AM and school starts at 8:15 AM

• Only one in the bathroom at a time

• School assumes late = 10 minutes

• Everyone is waiting at the door to take their turns
Who’s First?

• In what order should the children go?
## Calculations

<table>
<thead>
<tr>
<th>Order</th>
<th>Child</th>
<th>(1) Start Time</th>
<th>(2) Bathroom Time</th>
<th>(3) End Time (1) + (2)</th>
<th>(4) Walk Time</th>
<th>(5) Arrive at School (3) + (4)</th>
<th>(6) Lateness</th>
<th>School Starts at 8:15</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td></td>
<td>8:00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>15 – (5)</td>
</tr>
<tr>
<td>2nd</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3rd</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>4th</td>
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<tr>
<td>5th</td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Results

<table>
<thead>
<tr>
<th>Order</th>
<th>Total Min Late</th>
<th># Late</th>
<th>Avg Min Late</th>
<th># Late Over 10 Min</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Come, First Served</td>
<td>37</td>
<td>4</td>
<td>9.25</td>
<td>2</td>
</tr>
<tr>
<td>Shortest Processing Time (Bathroom)</td>
<td>28</td>
<td>3</td>
<td>9.33</td>
<td>1</td>
</tr>
<tr>
<td>Longest Processing Time (Bathroom)</td>
<td>45</td>
<td>4</td>
<td>11.25</td>
<td>3</td>
</tr>
<tr>
<td>Earliest Due Date (Shortest Walker)</td>
<td>41</td>
<td>4</td>
<td>10.25</td>
<td>2</td>
</tr>
<tr>
<td>Latest Due Date (Longest Walker)</td>
<td>34</td>
<td>4</td>
<td>8.5</td>
<td>2</td>
</tr>
</tbody>
</table>
Now you are an Engineer!
Sharing Our Legacy

• Reach out to the youth
• Bring fun to the table!
  – Play games to develop/discover skills
• Make them see their options
  – Exposure to REAL people
Our Future = Their Future

- Do not stand in the way of a person’s dream – even your own
- World is more flexible & virtual
- Use support systems – professional organizations
  - SWE - Society of Women Engineers
  - LVEC – Lehigh Valley Engineering Council
In Closing

What ever you can do,
Or dream you can,
Begin it,
Boldness has genius,
Power, and magic in it.
Support....

• Contact me at: 
  mstuart@efficiencyengineers.com

• Ready and able to present to students of any age!!