Build Your Foundations

Skills that will last you a Lifetime
Content

- Introduction
- Marketable Skills
- Additional Skills to Acquire
- Useful Web links
- Non Traditional Careers
Why I chose Physics?

- Explains Natural Phenomena
  - Smallest – Atoms and beyond
  - Largest – Universe, Cosmos, Everything

- Relies on the Scientific Thought Process
  - Math, Data & fact based
  - Proven and validated
  - Challenges existing theories and always asks WHY?

- Is the FOUNDATION for all Sciences 😊
Education/Career

❖ **Education**
  Ph.D in Physics from UIUC

❖ **Career**
  Failure Analysis & Yield Engineer – HP
  Foundry Alliance Yield Engineer/Manager – Agilent & Avago

  CAREER SHIFT

  Focused Improvement Manager – Nestle Inc.,
  Goal Alignment Generalist – Nestle Inc.,
What Marketable Skills does *Physics* Teach You?
Technical Skills - Physics

Problem Solving

What, Where, When, Who, Why

The Why-Why Process
Very fast it was recognised, that pigeons were the cause of the damage and the people tried to kill the pigeons...however there appeared always new pigeons...

The Lincoln Memorial in Washington seemed to be destroyed step by step.

...until the people asked themselves:

Why is the monument getting destroyed step by step?
As the excrements of the pigeons destroy the stone.

Why were there so many pigeons?
Because they like to eat so many spiders, as there are so many.

Why are there so many spiders?
Because they like to eat so many beetles, as there are so many.

Why are there so many beetles?
As they like a warm place at the Lincoln Memorial.

Why is it such a warm place?
As the illumination at night heats up the stones.
Example of a 5 Why Process

You discover coolant leaking from a machine

Coolant is leaking from the machine.

A seal was damaged.

Metal shavings got into the coolant.

A screen on a coolant recycling pump was broken.

Root Cause: The screen is located in a place where it was likely to be damaged by dropped parts.

Action: Redesign machine, or add guard to cover the screen and prevent damage. If the seal was merely replaced, it would have soon needed repair again as the damage repeated itself.

Helps Identify True Root Cause, so that the correct Counter Measures can be implemented to Eliminate the problem
Technical Skills - Physics

Analytical Skills

Data Analysis
Statistics
Tools Like: Excel, MiniTAB, MS Access
Technical Skills - Physics

Unique Process Knowledge

Micro/Nano Device Fabrication

Experience with Analytical Equipment like

Electron Microscopes
Surface Analysis (EDAX, Auger etc)
Cryogenics
Non-Technical Skills - Physics

Presentations

PowerPoint presentations
Public speaking
Non-Technical Skills - Physics

Teaching/Coaching
(Teaching Assistant)

Teaching classroom setting – Adult learning
Coaching/mentoring co-workers
The Differentiators
Specific Skills that are Valued

- **Statistical Process Control (SPC)**
  - It is a method of quality control which uses statistical methods. SPC is applied in order to monitor and control a process.

- **Expert level in MS Applications**
  (Ex: MS Excel, MS Access etc)

- **Lean and Six Sigma Methodologies**

- **Programming (C++, Unix, Excel Basic)**
Six Sigma

5 Step Process to reduce Process Variation

- Problem Solving to understand root cause of failures & implement Counter Measures
Six Sigma

What is Six Sigma Levels of Quality?
(3.4 defects per 1 million opportunities)

<table>
<thead>
<tr>
<th>99% Good (3.8 Sigma)</th>
<th>99.99966% Good (6 Sigma)</th>
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<tbody>
<tr>
<td>Unsafe drinking water for almost 15 minutes each day</td>
<td>One unsafe minute every seven months</td>
</tr>
<tr>
<td>2 short or long landings at most major airports each day</td>
<td>1 short or long landing every 5 years at each airport</td>
</tr>
<tr>
<td>No electricity for seven hours each month</td>
<td>1 hour without electricity every 34 years.</td>
</tr>
<tr>
<td>5,000 incorrect surgical operations per week</td>
<td>1.7 incorrect operations per week</td>
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Sigma Comparison of Industries

Source: GE Medical Systems
Continuous Improvement - Goal Alignment
Soft Skills

People Skills

OFFICIAL NOTICE
ALL JOBS REQUIRE PEOPLE SKILLS

Empathy
Good Communication Skills
Active Listening
Leadership Skills
Networking

The Importance of Networking should not be underestimated!
Networking Ideas

- Conferences, Colleagues, Past Students
- Professional/Social Media
- Industry Specific Recruiters
- Industries in your Geographical Area
  - Find out what they do
  - Consider Interning with one
  - Read papers/journals/trade magazines in your area of interest
Non Traditional Careers
Industries

- Any Manufacturing Industry
- Software Programming/Modeling
- Financial Forecasting and Analysis
- Market Research

Do not limit your choices!
Useful Links for Career Development
Websites for Reference

- American Management Association
  - www.amanet.org

- American Society for Quality
  - www.asq.org

- Six Sigma
  - www.isixsigma.com

- Linkedin
  - www.linkedin.com