IRIDIGM

An Industrial Physics Toolkit

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Physicists in Industry

- Where Do They Come From?
  - How do they get there?
  - What do they do?
- What is Iridigm?
- Technology Development
- Career Management
  - Marketing
  - Skill Mapping
  - Skill Development
- Concluding Remarks

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Acknowledgements

My great thanks go the the staff of:

Statistical Research Center

www.aip.org/statistics

For their excellent reports.

I hope I haven't misinterpreted too much of their data.

Physics Employment

Four Major Areas:

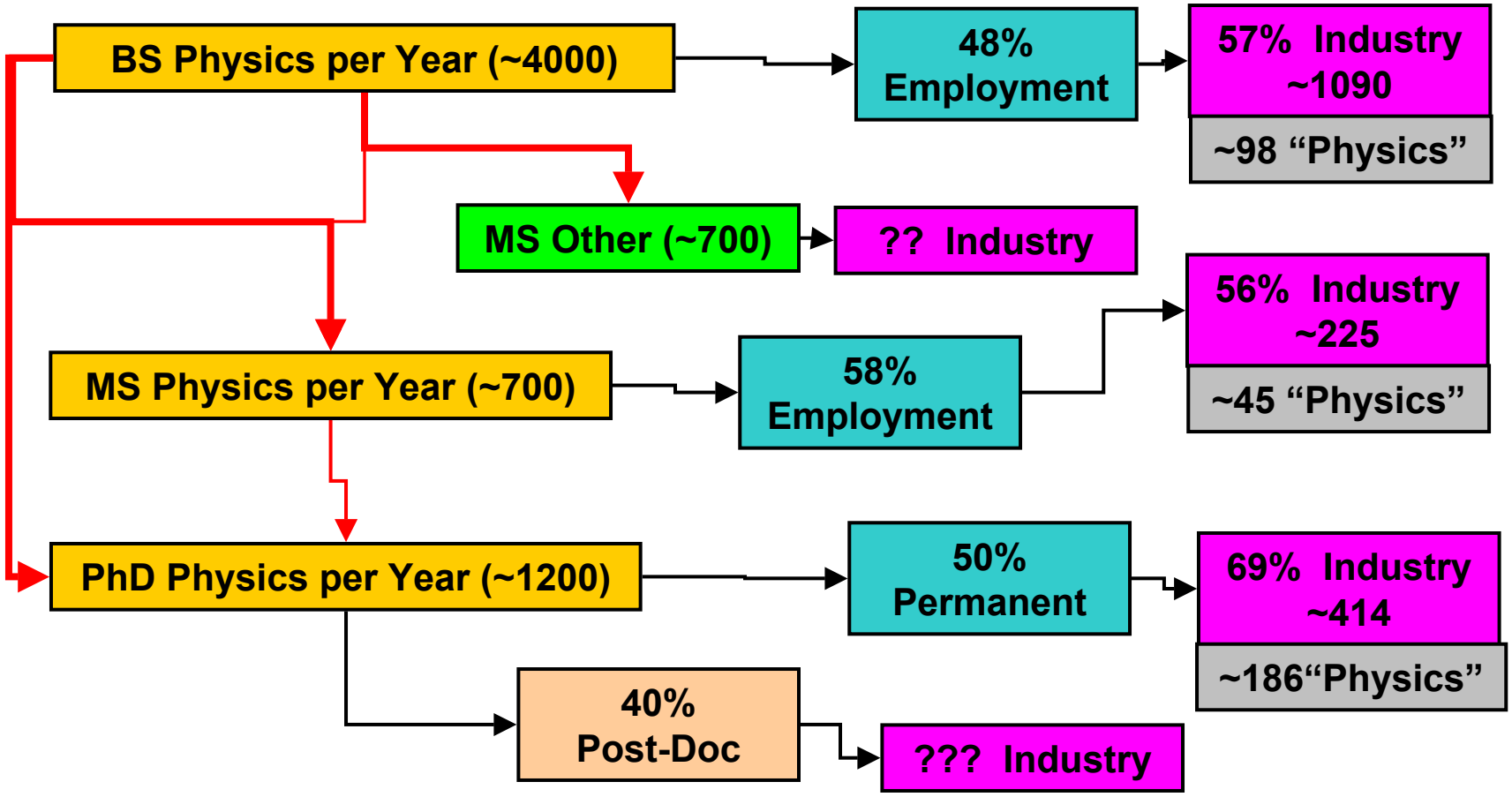
1) Work at University, UARI or other Academe
2) Work for government or FFR&D Center
3) Work for Private Company, Consultant, or Self-Employed
4) Work for a non-profit, medical services

In this presentation, any employment in this category (#3) will be considered "Industry"

Physics Degrees Flow

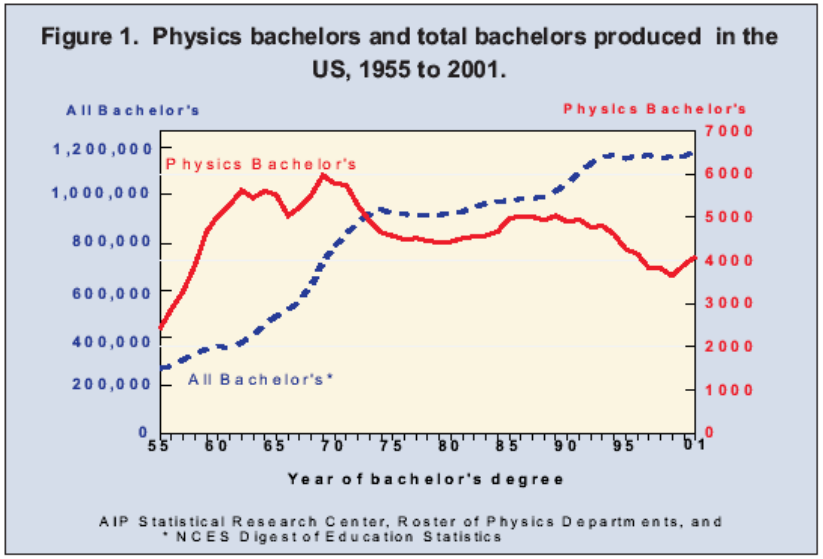
Data from AIP Statistical Research Center-

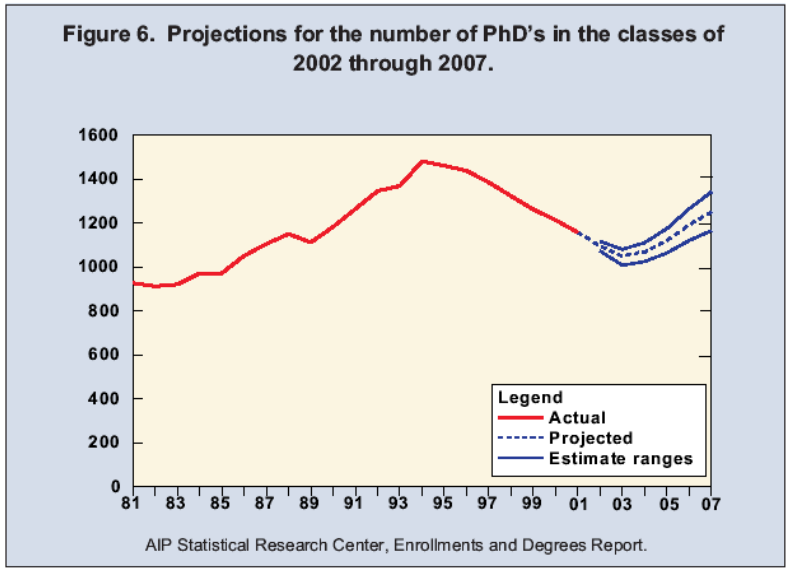
Caveat: This is my personal analysis and may not be correct (static assumption);
Latest data: classes of 2000 and 2001 combined.



Conclusion:

- Almost HALF of all Physics Majors eventually work in “Industry”
  - **Between 1200 and 2000 New Hires/Year in Industry with Physics Background**
  - **Very few in “Physics” positions!**
- Long Term Trend (last 20 years) is fairly flat.





Type of Work

Roughly half the Physicists in Industry work in focused SHORT TERM research or development !

Work Activity	%
Short-range research	
Development, design, and engineering	27
Short-range applied research	19
Long-range research	
Long-range applied research	16
Basic research	5
Administrators	13
Consultants	10
Other	10

Table 2. Industrial Ph.D.'s by work activity, 2002.

Iridigm Location

Iridigm® Display Corporation

Pac Bell Park

Iridigm

Iridigm Facilities

“Raw” industrial location

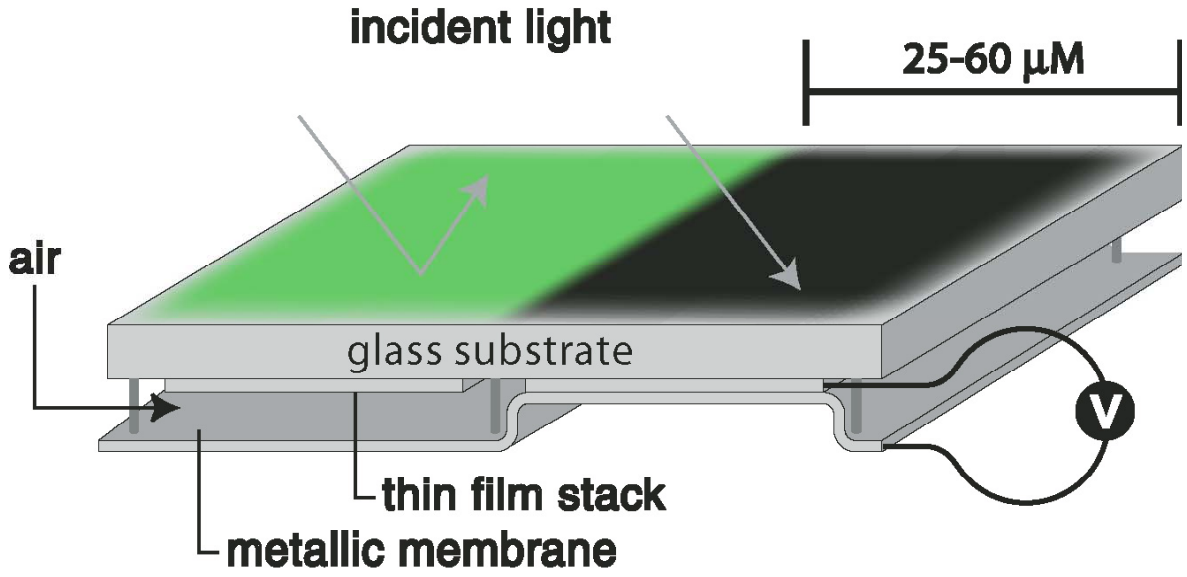
- Office - 5500 sq. ft.
- Fabrication - 3000 sq. ft. (1200 sq. ft. cleanroom)
- Systems - 1000 sq. ft

iMoD: Concept

Interferometric Modulator (iMoD)

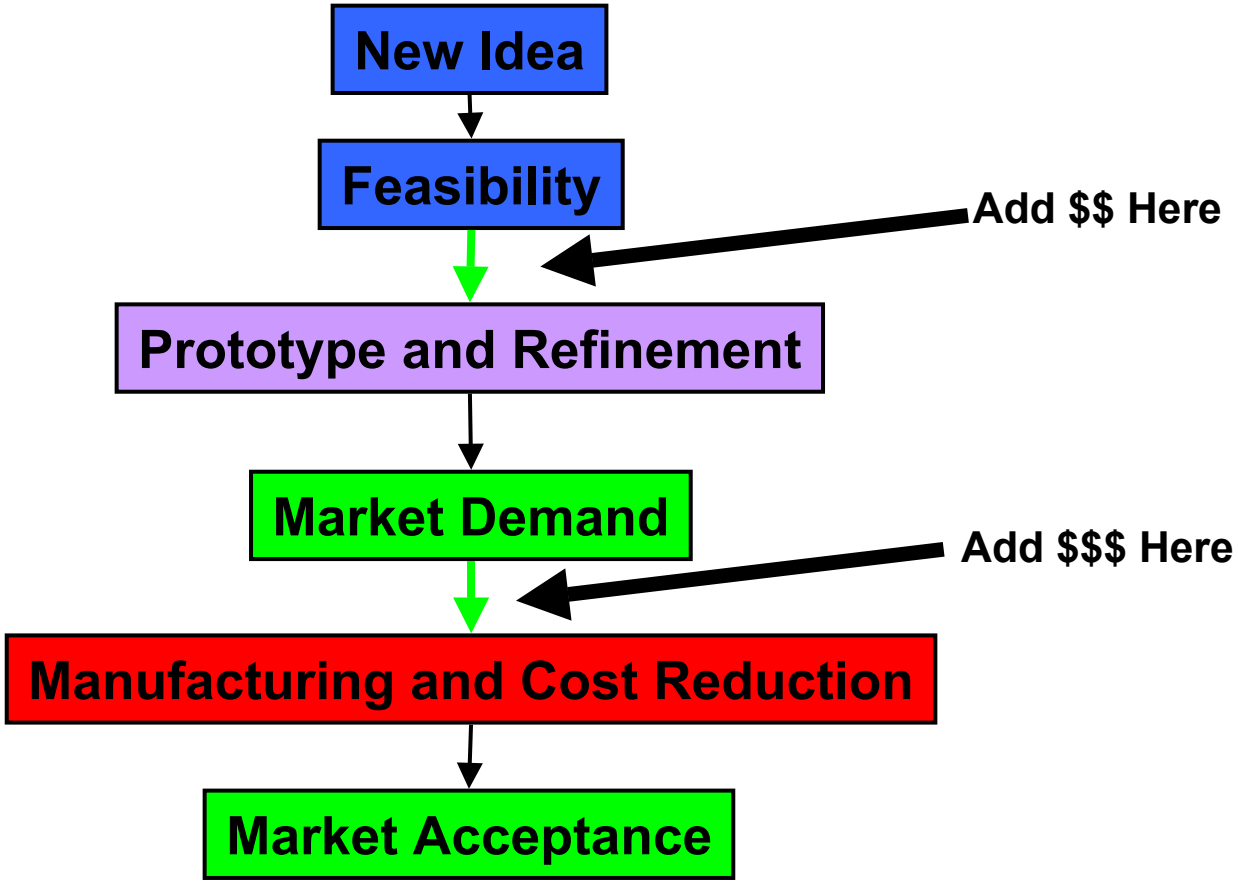
Direct View MEMS based Flat Panel Display Technology

- **Color from Simple Fabry-Perot Etalon Structure**
- **Switching from moveable metallic membrane**
- **Fast response (10's of microseconds)**
- **Simple structure of all sputtered films**



Technology Development

Iridigm is an example of a FOCUSED new technology business



This is the dominant model for R&D in the Private Sector

Four Step Program

Four Steps for Industrial Career

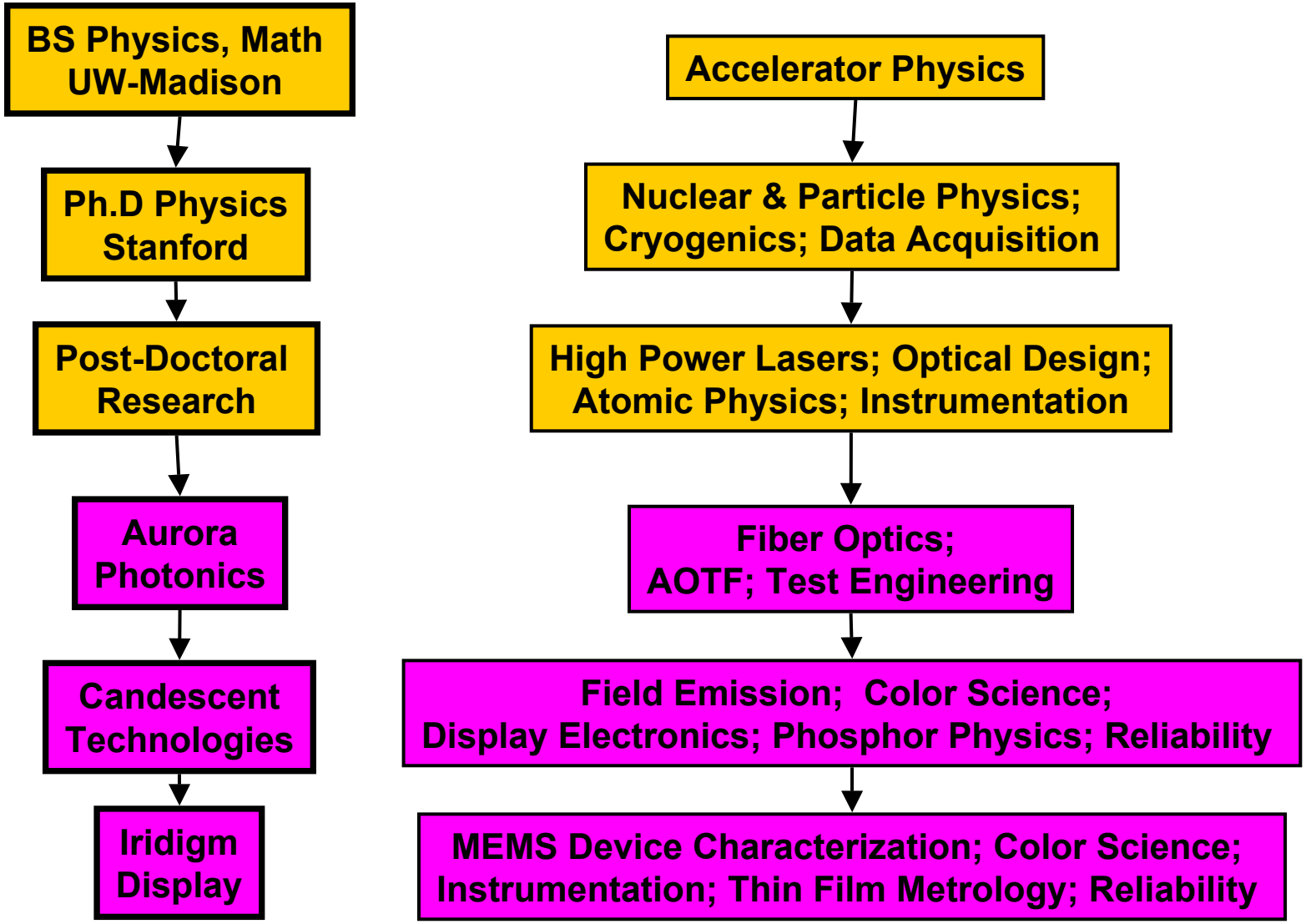
- Choose Career Path
- Skill Mapping
- Skill Development
- Skill Transfer

Step 1: Choose Career Path

A career in FOCUSED development requires:

- Filling an organizational need
  - Match your skills to job opening
- Developing skills needed for project
  - Grow with demands of organization
- Strong self-marketing skills
  - Build an effect resume
  - Maintain a good network
  - Be prepared to change jobs
- Commitment to continuous change

A Personal History

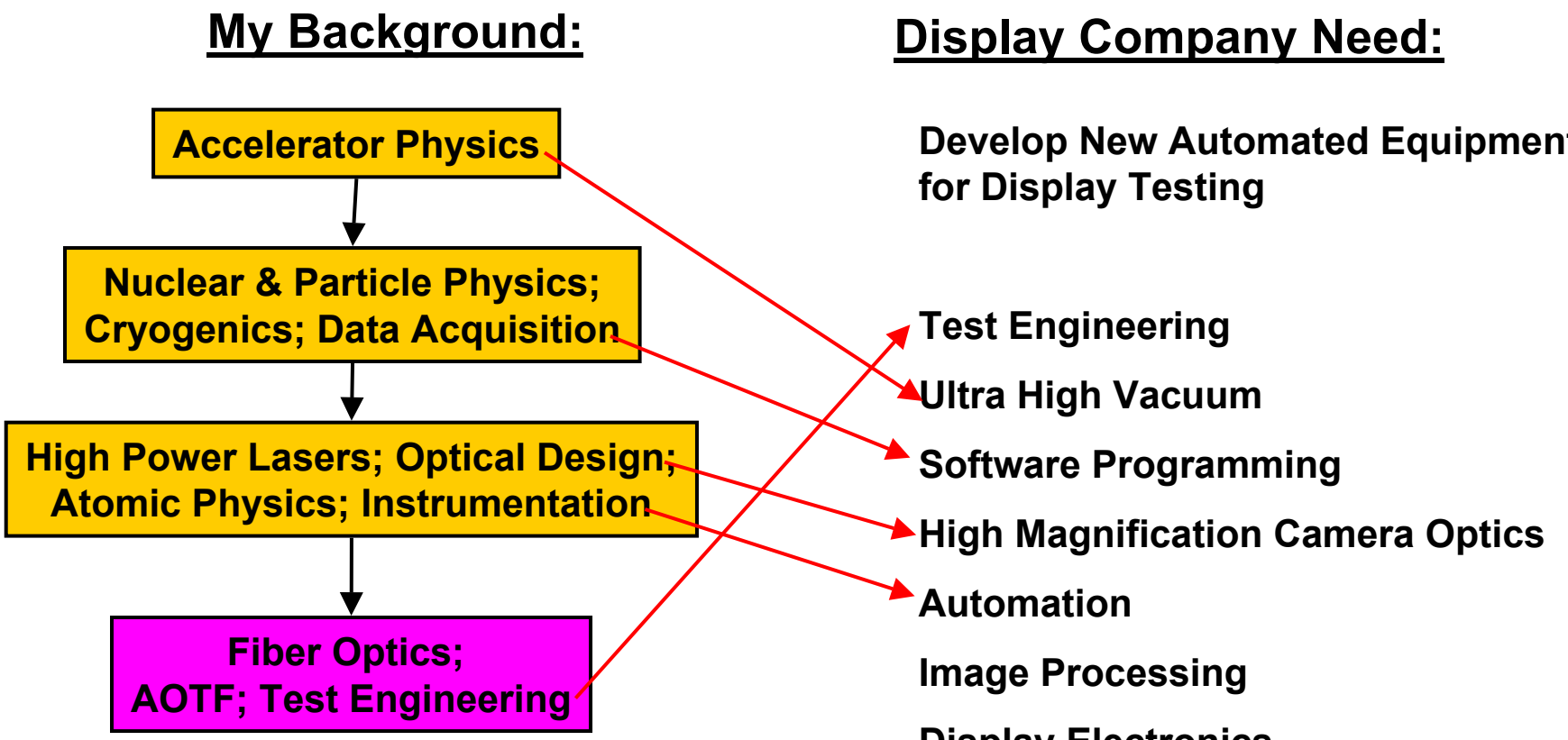


Step 2: Access Your Skills

Skill Mapping

- Resume should be “Skill Driven”
  - List Skills First
    - Include Quantitative Experience
  - Work Experience (must reinforce skills)
    - Emphasize Leadership
  - Education After Experience
- Layout is not important
- Adjust resume to job opening
- Target companies without openings
  - If they need your skills

Example: Skill Mapping



Step 3: Develop Skills

Skill Development

- Develop “Non-Academic” Skills
  - Working in Interdisciplinary Teams
    - Respect for other backgrounds
    - Many educational levels
  - Effective Time Management
  - Cost Management
    - No Free Labor in Private Sector
    - Purchase Productivity Tools
- Invent Something!
- Update Resume
  - Keep a clear understanding of your skills
  - Work to fill out skill set.

Example: Skill Development

Display Company Begin	Display Company End
Test Engineering	Test Engineering
Ultra High Vacuum	Ultra High Vacuum
Software Programming	Software Programming
High Magnification Camera Optics	High Magnification Camera Optics
Automation	Automation
Image Processing	Image Processing
Display Electronics	Display Electronics
Atomic Physics	Color Science
Experiment Spokesman	Phosphor Physics
	Project Management
	Reliability Engineering
	Innovation (patents)
	Thin Film Metrology

Step 4: Transfer Skills

Transfer Skills

- Move to a new position!
  - Take a different role in current company
  - Move to a new company
- Increase the leverage of your position
  - Management
    - More direct charges
  - Productivity
    - Faster results
  - Intellectual Property
    - More inventions

Example: Skill Transfer

First Display Company

- Test Engineering
- Ultra High Vacuum
- Software Programming
- High Magnification Camera Optics
- Automation
- Image Processing
- Display Electronics
- Color Science
- Phosphor Physics
- Program Management
- Reliability Engineering
- Innovation (patents)
- Thin Film Metrology

Second Display Company

- Test Engineering
- ~~*Ultra High Vacuum*~~
- Software Programming
- High Magnification Camera Optics
- Automation
- Image Processing
- Display Electronics
- Color Science
- ~~*Phosphor Physics*~~
- Program Management
- Reliability Engineering
- Innovation (patents)
- Thin Film Metrology
- **MEMS**

The Toolkit

Now we can come back to the title of this talk:

- [P7.005] **An Industrial Physics Toolkit**

Once you complete these four steps; you have built a transferable collection of skills which could be called a "Toolkit."

The rest of the story is that you have to continue the process as your career and technology progress.

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My Current Toolkit

Most Important

- Project Management
- Reliability
  - MEMS
- Instrumentation
- Data Analysis
- Presentation
- Inventing
- Modeling
- Color Science

Key Secondary List

- Electronics
  - Prototype circuits
- Machining
  - Mechanical Design
- Writing
  - Instruction Manuals
- Software
  - LabView
  - MatLab

Concluding Remarks

Physicists in Industry:

- Work on exciting & interesting projects
- Have transferable and marketable skills
- Have high job satisfaction
- Have a very low unemployment rate

BUT

- Do not arrive by one path
- Need to manage their careers