

Technology Challenges in Designing the Future Grid to Enable Sustainable Energy Systems

Workforce Development Challenges

Wanda Reder

VP – S&C Electric Company

Chair – IEEE Smart Grid

President - IEEE Power & Energy Society President 2008-09

Wanda.reder@sandc.com



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Changing Power & Energy World



Growing Population, More Electronics



Rising Cost of Energy



Increasing Environmental Requirements



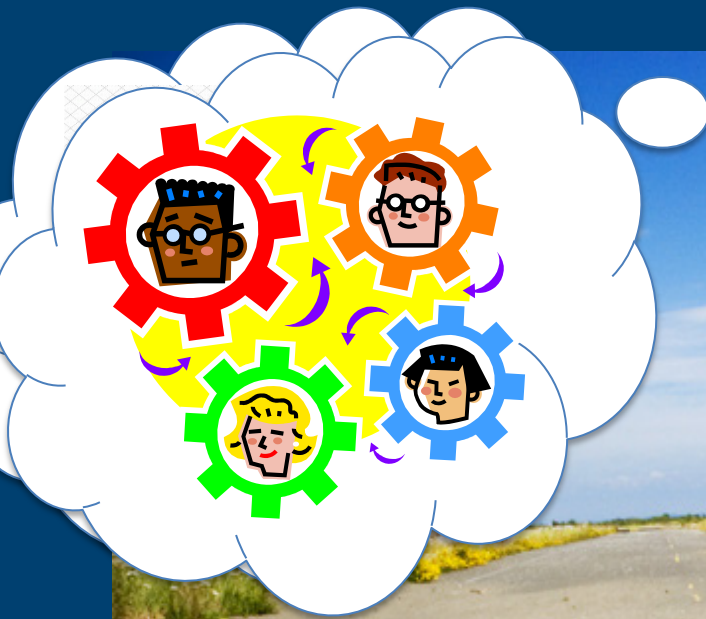
Escalating Security Concerns



Heightened Investor Demands

Driving Technology:

- Carbon Management
- Electric Transportation
- Sustainability
- Distributed Sources
- Efficiency
- Modernization
- Reliability



Challenges: Big Picture Messaging

- Big picture messaging
 - Connection to sustainability
 - Acknowledging societal costs
 - Linkage to global competition
 - Macro-benefits
 - What-if scenarios
- Audiences
- Implications
- Ownership



Challenges: Supply and Demand

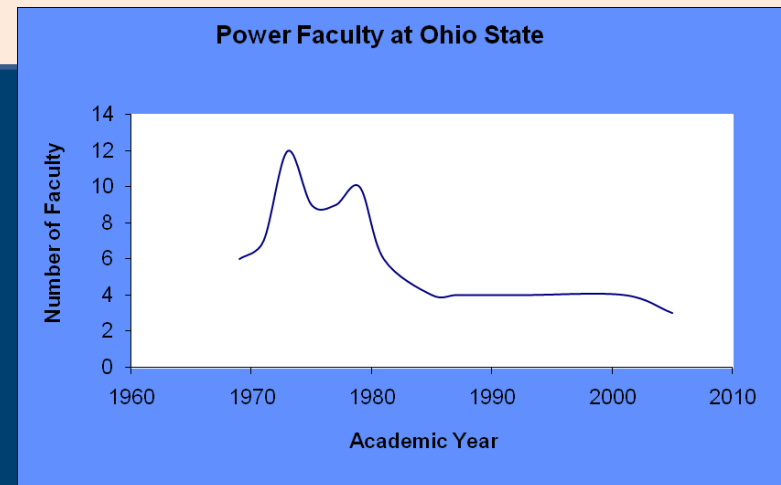
- Knowledge and quantification
- Outsourcing impact
- Productivity gains
- Believability
- Nimbleness
- Scenario planning
- Risk assessments
- Responsibility to measure
- Alignment ownership

“52 % of skilled technicians and engineers may need to be replaced in the next 10 years”

Source: 2011 CEWD Workforce Survey

Power engineering programs are weakening, declining, or ending

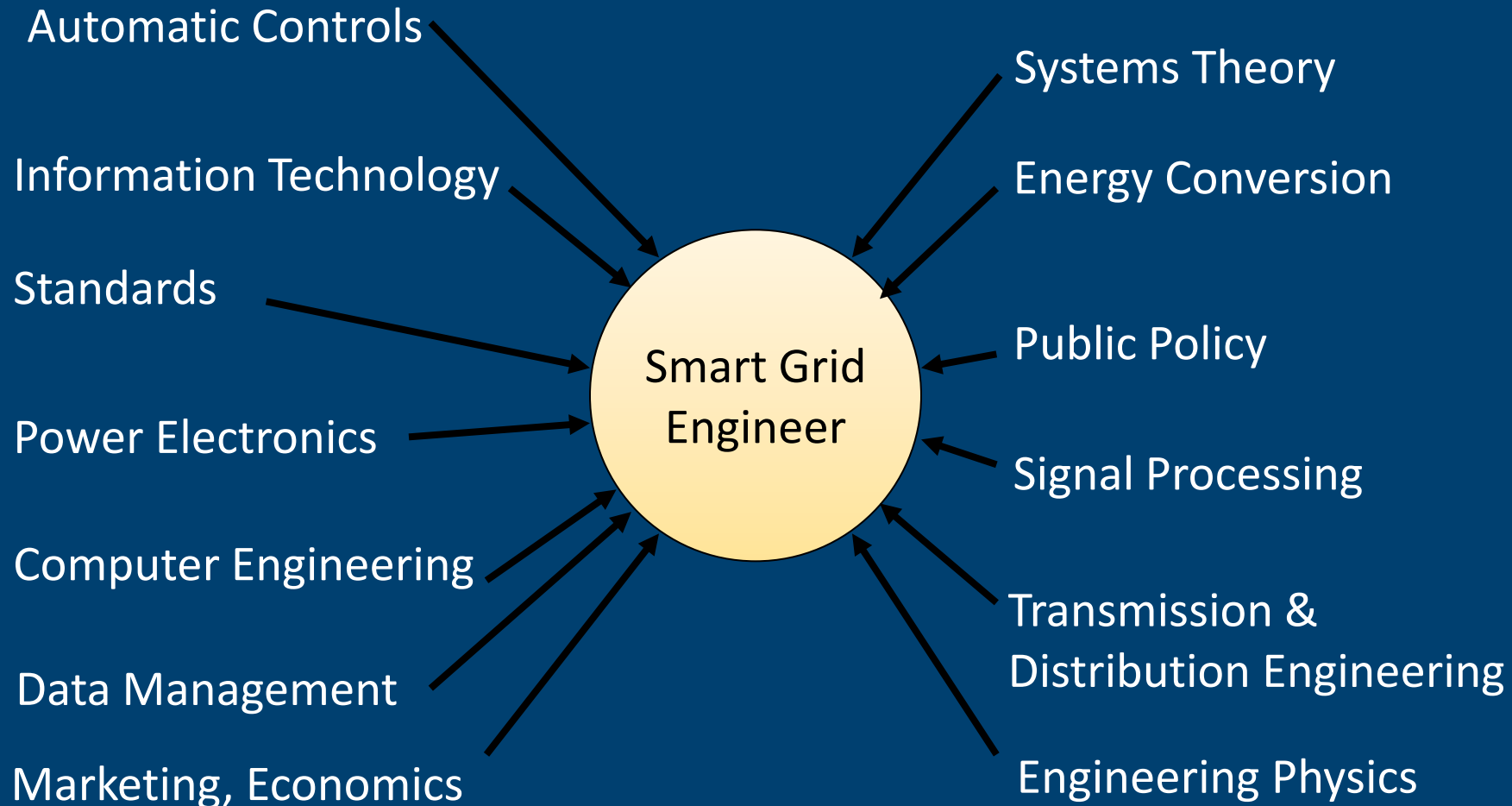
Source: IEEE Power Engineering Education Committee



Challenges: Education

- **Availability of programs**
 - Faculty demographics
 - Monitoring of academic supply and demand
 - Visibility of programs
 - Research and workforce needs are not aligned
 - Modular design
- **Industry participation**
 - Relevance
 - Transitioning intellectual property
 - Undergraduate specialization is becoming less prevalent
- **Curriculum development**
 - Acceptance of on-line teaching
 - Institutional cross-collaboration
 - Nimbleness to meet needs

Smart Grid is Multi-Disciplinary



Challenges: Focus and Planning

- Short-term business focus
 - Lack proactive hiring
 - Cut training programs
 - Do more with less mentality
 - Outsource
- Strategic visibility & planning
 - Competency definition
 - Succession planning
 - Retention
 - Diversity
 - Requirements for foreign nationals
 - Business risk quantification



Challenge: Managing the Transition

- Monitor and develop skills
 - Tribal knowledge
 - Knowledge transfer
 - Existing and new employee development
- Consider new technologies and processes implications
- Limited time for mentoring
- Embracing diversity
- Foreign national implications
- Organizational silos
- Engineer \neq Engineer

**Workforce Transition
Strategy Matrix**

	Workforce Transition Strategy Matrix	
	Legacy Assets	New Assets
New Employees	<i>Mentorship</i>	<i>Curriculum Development</i>
Existing Employees	<i>Knowledge Transfer</i>	<i>Employee Development</i>

Challenges: Awareness, Collaboration

- Identity?
- Outreach, role models
- Collaboration, leveraging and scaling
- Tools and timing
- Ownership
- Roles



Conclusion

- Business is changing: workforce needs to evolve
- Challenges:
 - Big picture messaging
 - Supply and demand alignment
 - Education: availability, curriculum, industry involvement
 - Multi-disciplinary recognition
 - Visibility, planning, short-term focus
 - Collaboration and awareness
- Opportunities for government, educators and industry
- Managing the transition is CRITICAL!