STEM Graduate Degree
Industry Career Trends

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Bottom Line Up Front

• The need for engineering program graduates has grown dramatically over the past 4-5 years
• High demand and competition for talent in emerging disciplines
• Aerospace and Defense requirement for security clearances means we need more US citizens to seek and obtain STEM degrees
• Close engagements at over 90 ABET-accredited universities, professional societies, and student organizations
  – Online degree trends increasing
  – Certain non-degree certificate programs are high value
• Industry focus on graduate STEM training for existing employees
• Policy recommendations to increase availability of diverse graduate STEM candidates with US citizenship
Who are we hiring?

• Over 150 graduate students hired each year from over 30 schools
  – Roughly 85% have STEM master’s degrees
  – < 10 PhD new hires hired each year
• The need for engineering and science program graduates has grown dramatically over the past 4-5 years
  – Systems Engineering
  – Computer and Software Engineering
  – Mechanical Engineering
  – Aerospace/Aeronautical Engineering
  – Electrical Engineering
  – Materials Engineering
• Hire employees with advanced degrees as we move to new fields
  – Computer Science and Math with course focus in software architecture and algorithm development, and machine learning and artificial intelligence
• Diversity levels for graduate-level hires on par for overall hiring
Education Alignment to Industry Needs

• Anticipate increasing needs:
  – Radio Frequency engineering, cyber, and data science
  – Software engineering, artificial intelligence, and machine learning NOC
  – Signal processing and systems engineering RTN
  – Widespread competition for emerging skills such as machine learning and artificial intelligence NOC, RTN

• Industry wide production labor shortages anticipated in ¹
  – Operations research analysts
  – Computer control programmers and operators
  – Mathematical science occupations

• Customer security clearance requirements drives need for US citizens to seek STEM degrees

• Good quality students – just not enough quantity
  – Opportunity to increase quantity of diversity in graduate STEM job candidates RTN

¹Department of Labor risk index for the projected 2014-2024 time period

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CONTAINS PUBLICLY RELEASABLE MATERIAL FROM LOCKHEED MARTIN, NORTHROP GRUMMAN, AND RAYTHEON
Recruiting Approach

• Close engagements at over 90 ABET-accredited universities
• In-depth masters and PhD student recruitment through funded research, faculty identification and specialized programs
  – Example: “NEXT” (accelerated development program to maximize leadership and technical development)
• Established partnerships with professional society and student organizations
• General preference for masters programs to include thesis research
  – Encourage projects related to company focus with a company representative on thesis committee
  – Some business elements prefer project-based masters
Post-Undergraduate Education for Employees

• Leadership development programs have several hundred current participants. These programs typically highly encourage participants to obtain a master’s degree, if not already acquired.
  – Engineering and Software Engineering
  – Information Systems
  – Operations

• Professional capability development in an employee’s current or future-desired domain encouraged and supported
  – Both undergraduate and graduate level coursework
  – Certain Certifications
  – Some companies offer access to a wide range of technical certifications\textsuperscript{NOC}

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Education Models & University Partnerships

• University partnerships through internships and funded research
• Seeing a larger online participation rate
  – Online is considered equivalent if the program is accredited
  – Prefer in-classroom learning and project participation, but support online coursework
• Graduate certificates and certifications supplementary to basic degree requirements
  – Cyber security certifications are very valuable
• Companies are partnering with universities to develop curriculum programs in need areas
  – Systems Engineering at Johns Hopkins University
  – Radio Frequency engineering at University of Colorado - Boulder

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Policy and Government Considerations
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• Recommend government grants to universities that bring academia and industry together to address STEM attraction and retention
  – DoD-sponsored grants for schools which include security clearances
  – Consider Australian model: Government pays for technology PhD programs, permitting industry “top-ups” to add additional research direction and guidance

• Student loan payoff programs for diverse, female, underrepresented minorities, and first generation college graduates pursuing STEM degrees

• Immigration and visa policy targeted towards retaining top talent in high demand STEM fields in the U.S.

• Increase mobility between industry, academia, and government laboratories and institutions

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Policy and Government Considerations
2 of 2

• Communicate business and industry needs for better understanding that STEM education requirements extend beyond math and science to engineering, technology, and computer science.

• Encourage policies that boost quality STEM education.
  – Ensure teachers receive high quality professional development, support, and the necessary resources to effectively teach at all levels.
  – Emerging trends/best practices, such as hands-on STEM competitions, classroom strategies, state of the art educational technologies, and project-based learning.
  – Promote public/private partnerships, incentives, and effective business & industry engagement in STEM education.
  – Implement full government funding for STEM related educational research and innovation investments (for example, Every Student Succeeds Act).

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