

SUMMARY:

- Elements of imaging system: radiometry, image formation, image sensing, processing, interpretation & action
- Imaging system market segments & future trends
- Key drivers: company competitiveness
- Have developed surveys focused on required roadmap inputs, have conducted 3 discussions and interviews to date and have others planned.
- Challenges: Groups are comprised of volunteers, manufacturing and technology investment strategies are typically proprietary, imaging systems comprise a broad spectrum of technologies
- Group comments:
 - o Focusing on EO Technology into infrared. Ultrasonic's are not being focused on at the moment.
 - o Difficult to anticipate future needs of cameras because new technologies drive new needs that people did not know they had.

National Technology Roadmap for Photonics

Imaging and Sensing Systems Roadmap

September 10, 2014

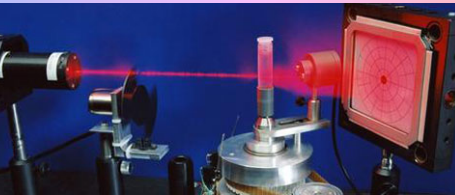
Co-leaders

Bob Fiete – Director R&D, Exelis Geospatial Systems

Mike Richardson – Distinguished Researcher, RIT

Team Members (to date)

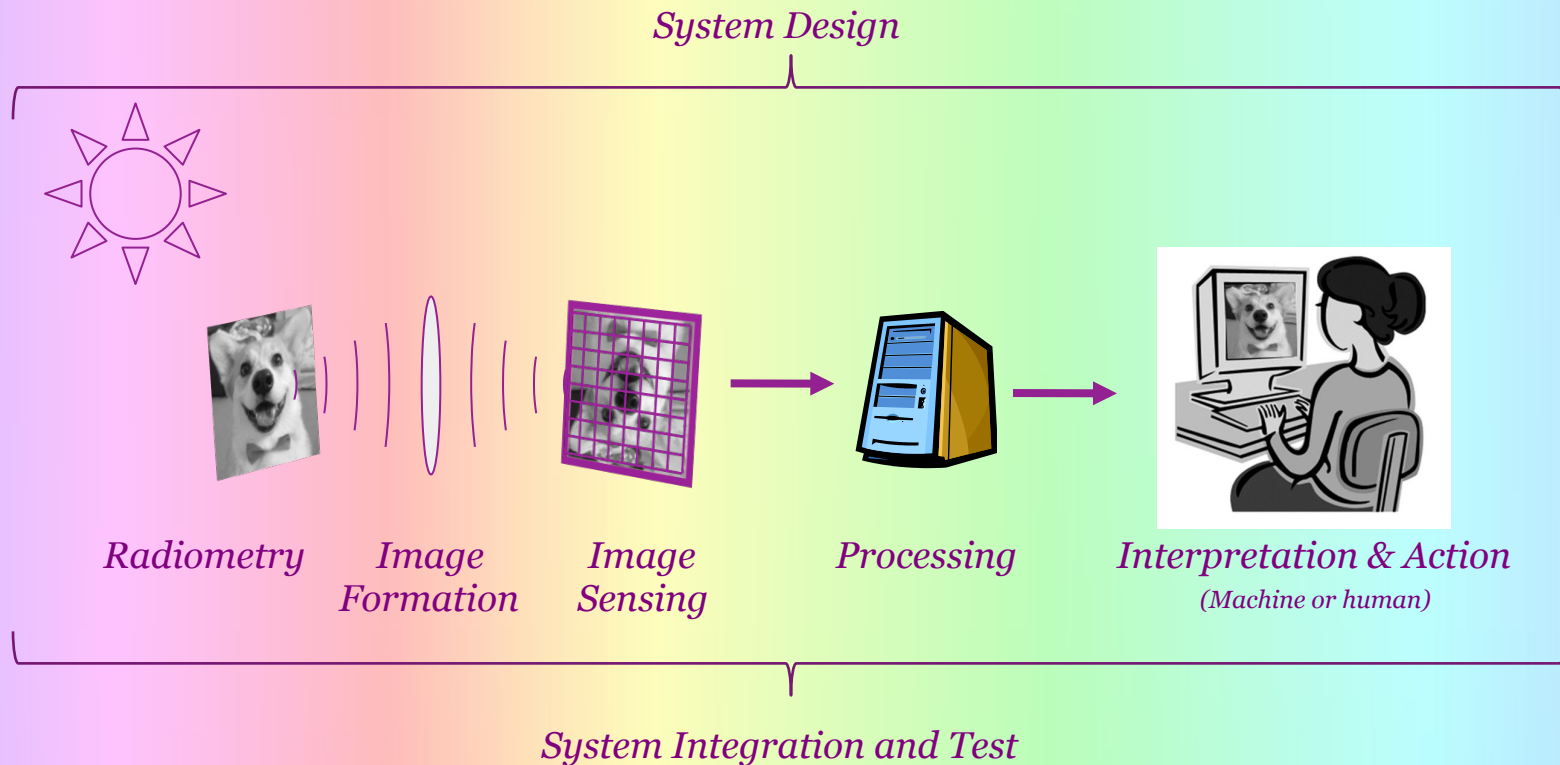
Rob Parada – Senior Imaging Technology Consultant



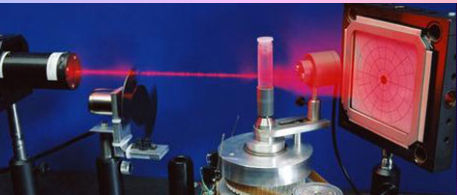
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Elements of an Imaging System



Which elements are most critical for manufacturing growth?

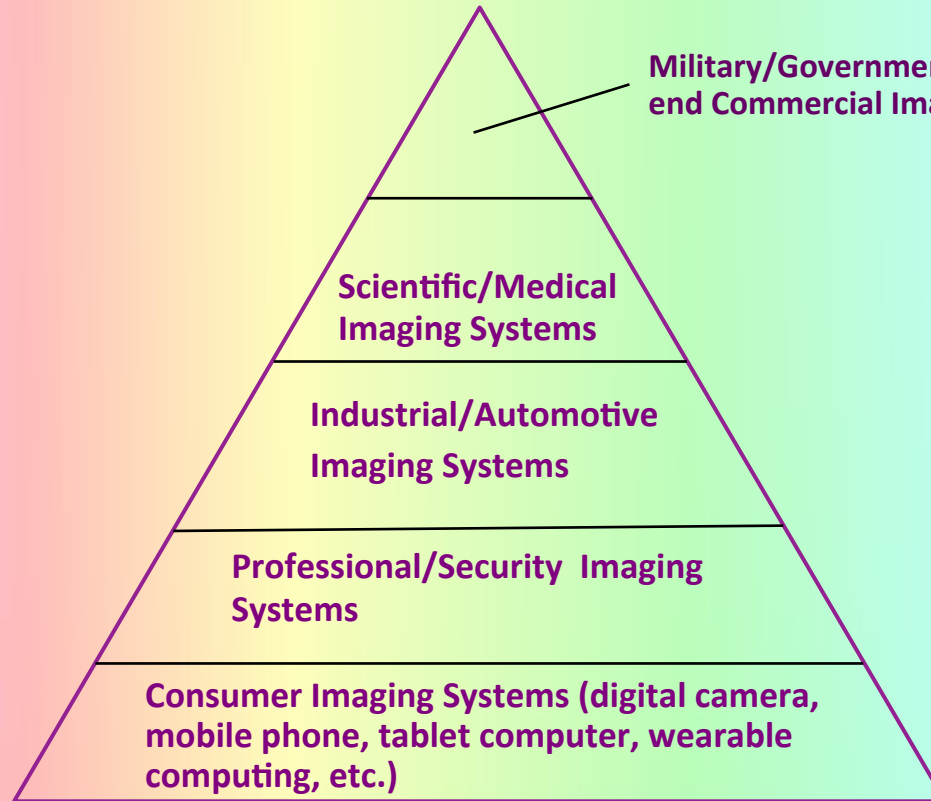


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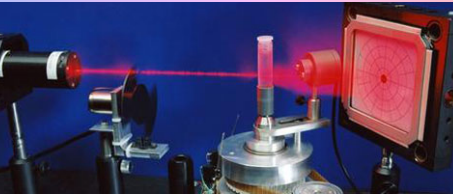
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Imaging System Market Segments

Complex, Custom, Limited
Production, High Unit Cost



General Purpose, High
Production, Low Unit Cost



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Imaging System Future Trends

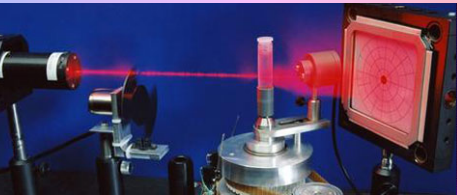
Component Technology

- Optics
- Sensors
- Radiometric sources
- Analytic processors
- Low SWAP-C

Integration “with the world” Technology

- Every image instantly “stored in the cloud”
- Convergence: selected images end up in a video game
- 24/7 Image capture
- Cameras located “everywhere” (buildings, borders, streets, vehicles, people)
- 3D Imaging System
- Wearable Imaging Devices
- “Grain-of-salt” Camera System
- VR Integrated Camera System

Imaging System Technology



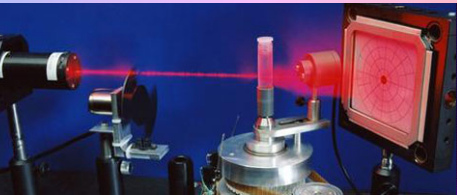
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Key Drivers: Company Competitiveness

- Internal Factors – elements a company can directly control
 - Cost structure (salaries, benefits, overhead costs, efficiency, etc.)
 - Organizational structure and communication between departments (marketing, sales, customer service, R&D, manufacturing, etc.)
 - Investment and innovation (R&D investment and prioritization of the right talent to execute)
 - Investment and market knowledge (marketing investment, the talent to execute, and an in-depth knowledge of the market)
- External Factors
 - Access to talent
 - Access to capital investment
 - Access to markets
 - Business climate (taxes, regulation, etc.)

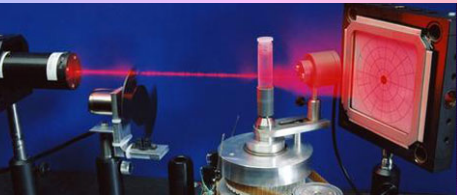


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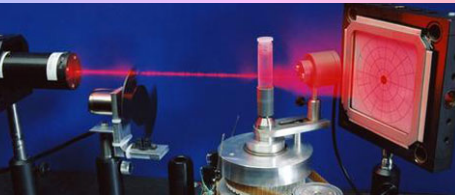
Survey and Interviews

- Survey developed to focus on required roadmap inputs
 - General (contact information, company overview and demographics)
 - Technology plan
 - Manufacturing capability and human resources
 - Business (products, competition, regulatory concerns, big picture drivers)
- Discussions and interviews conducted to date
 - Exelis Geospatial Systems – August 12, 2014
 - Carestream Health – August 28, 2014
 - ON Semiconductor (formerly Truesense Imaging) – September 3, 2014
 - *Kodak declined, citing they are no longer an imaging company*
 - *Ball Aerospace is reviewing opportunity with senior management*



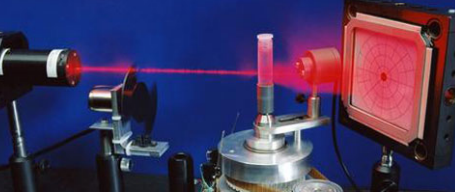
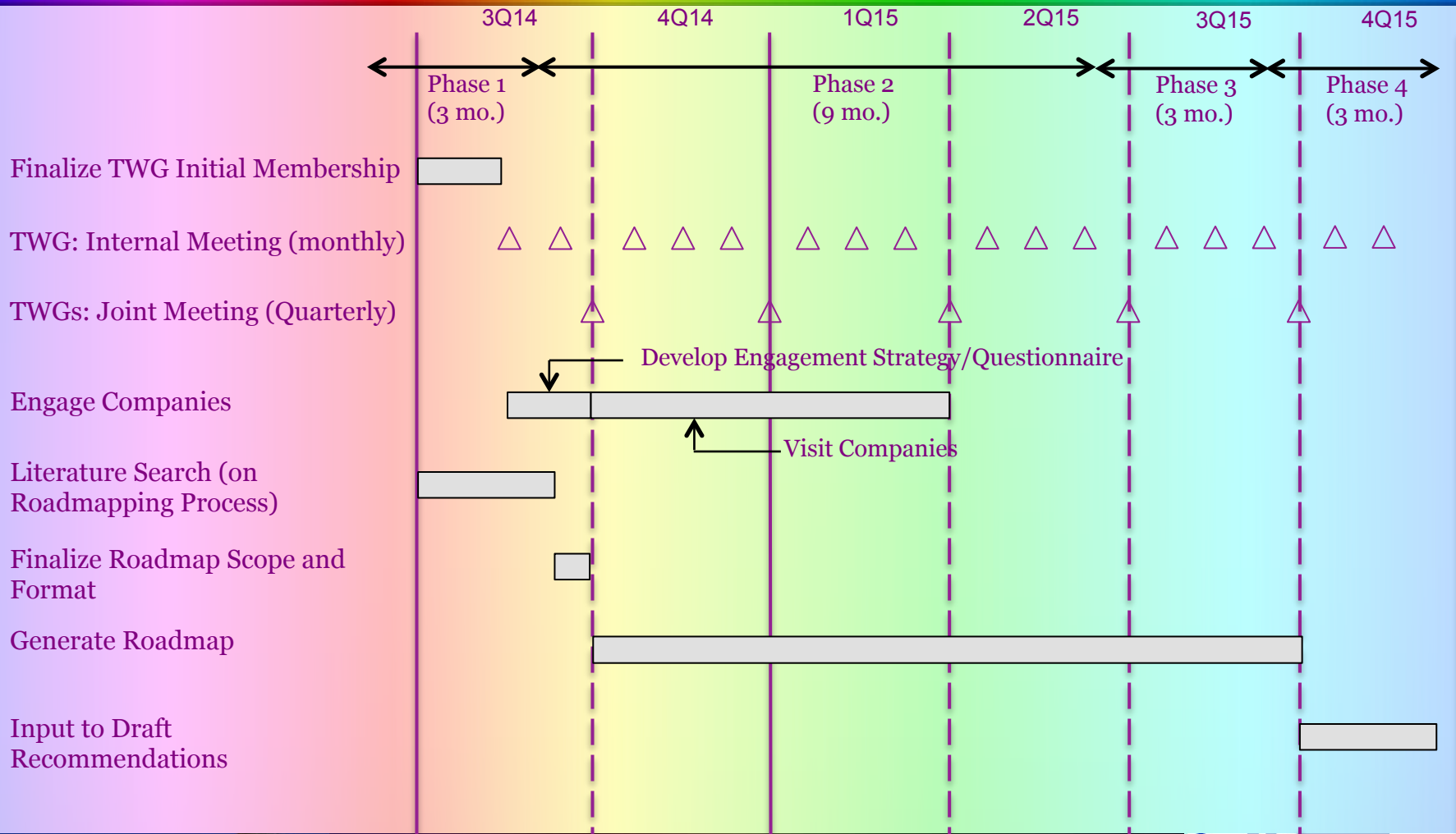
Challenges Foreseen

- TWG's are comprised of volunteers
 - Membership and necessary time from members will be challenging
- Details of manufacturing and technology investment strategies are typically proprietary
 - Access to “game changing” technologies within companies may be difficult
 - May be difficult to identify the manufacturing needs for future technologies
 - May be difficult to get broad spectrum of companies in consortium
- “Imaging Systems” comprise a broad spectrum of technologies
 - Need to find focus areas that best impact manufacturing growth



Timeline

Imaging Systems Technology Working Groups



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