Briefing to the National Academies of Science

NASA SBIR
Connecting to Industry
Prime Contractors

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NGC / ISCo

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Activities with NASA

Antibacterial, Anticontamination and Self-Cleaning Coating

JSC, Priority 5

Description and Objectives:

Theme of activity: Human spaceflight experience, such as on ISS, has demonstrated the need to control and/or eliminate bacteria and minimize particles (dust, fibers, skin cells, hair) in an enclosed environment.

Technical description: The Lotus Biocide coating is an antibacterial, anti-contamination, and self-cleaning coating.

Physical Description: The Lotus Biocide coating is thin (~ microns), lightweight and can be transparent to opaque. The biocide properties of the coating will not degrade with time or exposure to biological or chemical agents.

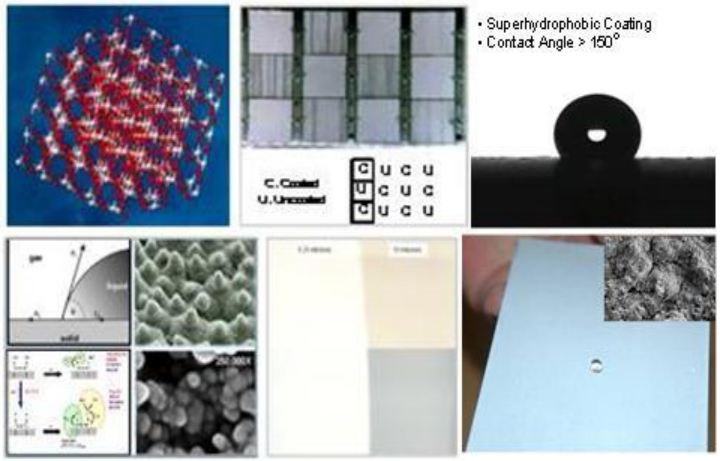
Short list of objectives: Design and execute an ISS experiment and compare with one-g measurements and results of radiation exposure

Technology Readiness/Implementation approach: TRL 3 to TRL 6, planned for MISSE 8 on STS-134

ROM Cost and Schedule: $500K and less than one year effort

Funds already allocated to the project.

- DARPA - $2.3 Mil
- NASA H&RT - $820K (partially spent)
- GSFC SBIR - $97K



Approach:

- Develop, characterize and optimize stable, Lotus effect coatings
- Provide samples of photo-electro-catalytic self-cleaning anti-contamination coatings for NASA ISS applications.
- Define earth-based and ISS-based experimental applications for long duration exposure, such as Meal Preparation or WCS mgmt areas
- Provide on-going support for ISS payload and materials integration

Collaborators/Roles:

- NASA JSC ISSPO manage and coordinate application of experiments
- NASA Goddard (Wanda Peters, Sharon Straka), NASA Glenn (Mark Hyatt), NASA Marshall (Miria Finckenor): Develop ISS and other NASA experiments and testing
- Honeybee Robotics (robotics), International Photonics Consultants (radiation testing)
- California Institute of Technology, University of Tennessee, City University of New York (coatings development)

Justification:

Value to Agency/Nation: This collaboration is cross-cutting technology and is relevant to all future Human Space Exploration activities, to reduce hazards to crew from pathogens or toxic chemicals. This technology can be used on future robotic missions, earth science missions, and space science missions. Any long-term human space mission will benefit from this technology. Since less toxic disinfectants will be needed, this is a very "green' technology with numerous potential spin offs including use on hospital walls, doctors offices and high rise windows.

Rationale for ISS accommodations: This Lotus biocide coating is proposed for the interior habitation areas, such as ISS, and crew modules to enhance air revitalization and waste management capabilities. The Lotus biocide coating is an antibacterial, anti-contamination, and self-cleaning coating that utilizes nano-sized semiconductor semimetal oxides (SMOs) to neutralize biological pathogens and toxic chemicals, as well as mitigate dust accumulation.

Point of Contact:

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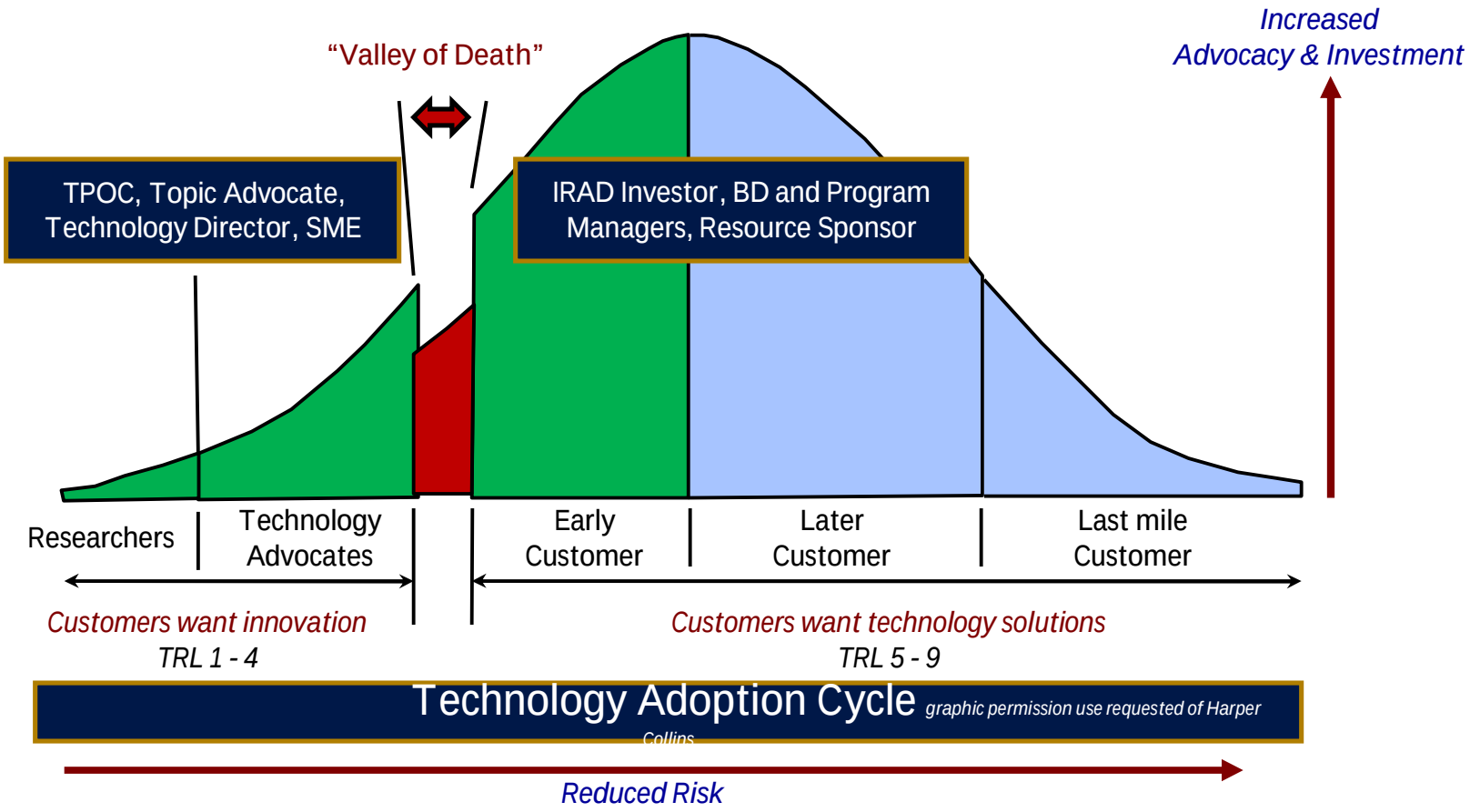
Northrop Grumman Aerospace Systems / Ken Cameron, 713.449.6094, kenneth.cameron@ngc.com

Bridging the Commercialization Gap



What can Primes do to Impact the Process?

Primes continue to strive for a more efficient, cost-effective, market driven methodology of sourcing solutions (partnering) to fill identified technology gaps in existing & emerging fields such as sensors, autonomous operations, energy efficiency and cyber security.

Improved methods (gained by working together, capturing valuable metrics and developing internal champions early on) to align member technology investment strategies with our customers' investment and procurement strategies.

Alignment of Efforts as a Risk Reduction / Endorsement

Construct

An industry consortium that reviews SBIR projects (in certain distinct Technology Domain areas) and makes group recommendations to the government on those projects the team believes warrant further investment beyond Phase II, accompanied by further industry engagement with these SBIR projects.

The Industry-Led SBIR Consortium "ISCo"

A Profitable Approach to Delivering Innovation

BAE Systems

Northrop Grumman

Lockheed Martin

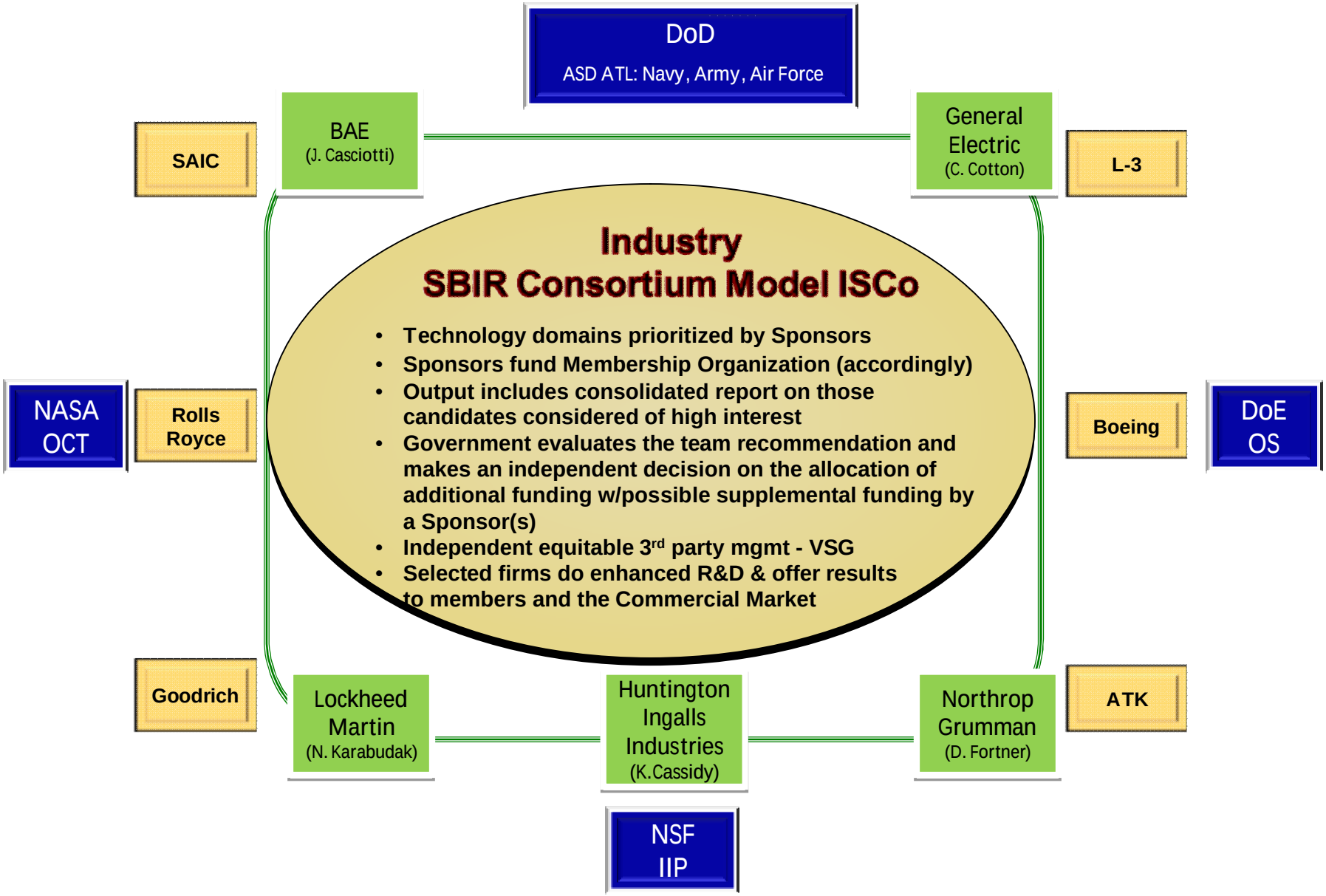
Huntington Ingalls Industries

General Electric

and

Vital Strategies Group

Participants / Awareness Organizations

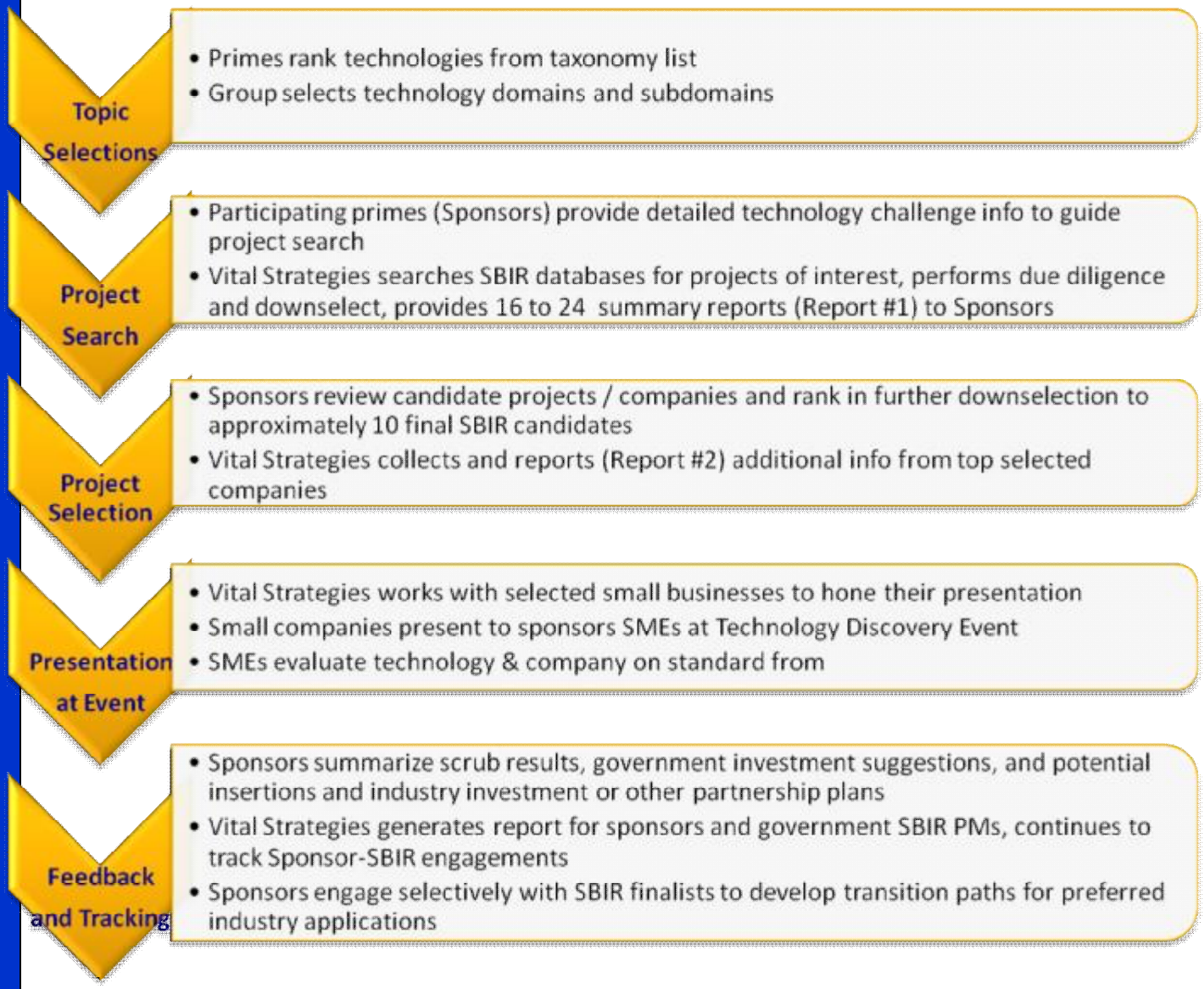


ISCo II Focus and Activities for 2011

Military Taxonomy Domain Categories with highlighted Topics for ISCo II - 2011

Categories	Domains
(A) Underpinning & Enabling Technologies	
	A01 - Structural & Smart Materials & Structural Mechanics
	A02 - Signature Related Materials
	A03 - Electronic Materials Technology
	A04 - Photonic/Optical Materials & Device Technology
	A05 - Electronic, Electrical & Electromechanical Device Technology
	A06 - Energetic Materials and Plasma Technology
	A07 - Chemical, Biological & Medical Materials
	A08 - Computing Technology & Mathematical Techniques
	A09 - Information and Signal Processing Technology
	A10 - Human Sciences
	A11 - Operating Environment Technology
	A12 - Mechanical, Thermal & Fluid-Related Technologies & Devices
	A13 - Autonomous Systems Technology
(B) Systems - Related Technologies	
	B01 - Lethality & Platform Protection
	B02 - Propulsion & Power Plants
	B03 - Design Technologies for Platforms & Weapons
	B04 - Electronic Warfare & Directed Energy Technologies
	B05 - Signature Control & Signature Reduction
	B06 - Sensor Systems
	B07 - Guidance & Control Systems for Weapons & Platforms
	B08 - Simulators, Trainers & Synthetic Environments
	B09 - Integrated Systems Technology
	B10 - Communications & CIS-Related Technologies
	B11 - Personnel Protection Systems
	B12 - Manufacturing Processes/Design Tools/Techniques
	B13 Renewable Energy Systems & Technologies

ISCo Process Flow



Four events in 2011 – two in early summer, two in fall

ISCo Collective Inputs from Sponsor SME's

SBIR Company Name:

Prime / SME Interviewer:

Technology Topic Number:

Technology Description:

Discriminator:

Technology overview, value and SBIR's plans to commercialize

Technology Status:
Current Plans to commercialize:

Project Information:
Funding Source:
Customers (current/potential):
Current or Prior ISCO Prime Engagement:
$$ Required to bring the technology to >TRL 6:

How the project evolved
Engagement with PEO's/Sponsor
Funding needed to attain necessary risk reduction

Potential Applications of the Primes:

Applications as seen by Sponsor SME's

Interviewers Go/Forward Recommendation:

SME recommendations to move forward or continue development by SBIR Firm

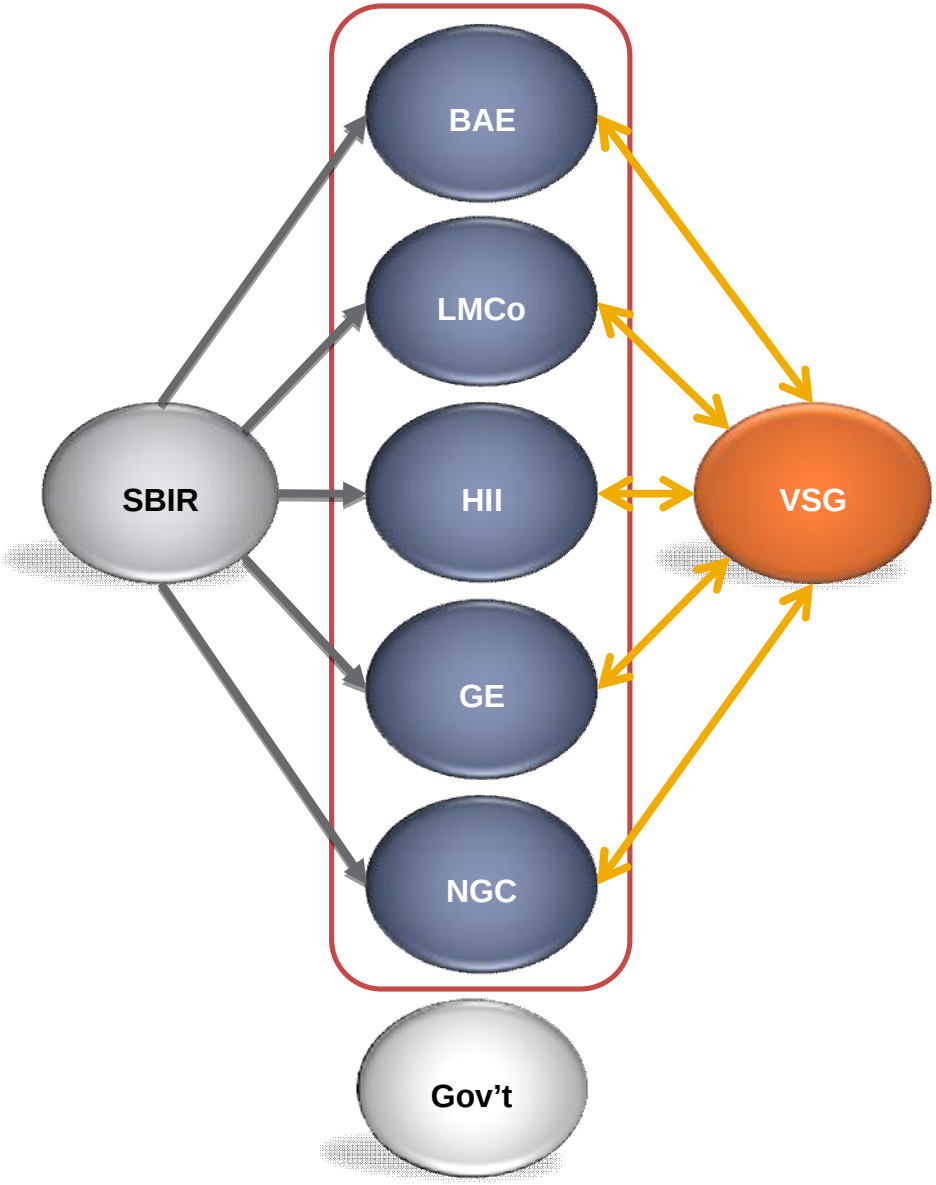
Recommended SOW LOE Required for Phase III Funding:

Specifically what LOE should the firm conduct to further attract interest by Sponsor SME's (as project extension effort)

Potential Interest/Level Of Prime Funding Investment:

Investment interest by Sponsor to supplement such efforts

How The ISCo Model Manages Risk



Sponsors execute a Common "1 Way" NDA with each SBIR

Sponsors each execute NDA's with Vital Strategies

Membership is open to all interested parties to join at any time

Documentation provided on SBIR firms is kept to a minimum so that all data that enters the public domain is a collective input from the group

Maintaining close cooperation with the Government PM's throughout the process

Sponsors act as advisors to the Government on added SBIR investment & make their own investment decisions in considered SBIR projects

Sponsors agree to disclose any prior relations with finalist SBIR firms and agree to maintain a high level of transparency through VSG

Expected Benefits

ISCo Value and Benefits

- Continuous and early engagement by SME's helps ensure Sponsors' Technology Gaps are being satisfied as we leverage our team making best use of the Consortium
  - **Sponsor SME's collaborate in a non-competitive manner in the interests of all**
- Flexibility to participate in one or more Technology Discovery Initiatives will enable broader willingness to engage as Sponsor interests expand
- Government gets credible multi-source input on technology and commercialization opportunities, including industry investment information to impact POR
- Tracking Reports provide visibility into both Sponsor/government interests
- The ISCo process is considered economically viable to its members
- Results in a Risk Reduction on the part of both Sponsors and government in transitioning select SBIR firms beyond Phase II

The ISCo Risk Reduction Model is Designed to be both Economical and Market Driven to Satisfy the Needs of ISCo Sponsors

ISCo Long Term Plan

- **Complete four new pilots by November 2011**
- **Continuously engage with government program and policy-making entities**
- **Share results and encourage further Industry/Government participation**
- **Host ISCo II program review by December 2011, plan for 2012**
- **Launch a formal, structured ISCo III program in 2012**