Industry’s Challenge in Transitioning Disruptive Technology

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Agenda:

• What is it?
• Why so hard?
• Success stories
• How should we do it?
Disruptive Modernization in 3-D

- Transitions can be disruptive in three areas:
  - New customer – new way to use existing or slightly modified product (Hellfire on Predator)
  - New process – new way to conduct operations (Performance Based Logistics Contracts)
  - New product – significant improvement of performance and cost or totally new capability
Disruptive Technology:

1. Promises major long term improvements in performance, cost, quality, and/or new capabilities
2. Isn’t yet part of a successful product – largely unproven in a practical application
3. Faces competition from existing systems and adversaries inside and outside industry
4. Lacks advocates, especially with customer
5. Forces change in a system which resists change
6. Can’t transition without perceptible risk for industry developer and user, potentially
   1. Significant development issues, missed IOC
   2. Poor performance, warranty-profit losses
   3. Damaged industry reputation
Difficulty of Transitioning

- Must educate large decisionmaker group
- Possible new customers – no history w/them
- Acceptably performing systems must be replaced. Are new capabilities good or bad?
- Monies must be found (difficult in any case)
  - Valley of Death (large investment to prove)
  - Unknown unknowns (survivability, environment, vulnerability, reliability, etc.)
- Doctrine and Force structure may be threatened/displaced/obsoleted
- Community of practice may be damaged
Industry line of business mgt prefers incremental modernization:

- Wants low risk, predictable customer, known volume, costs, and profits
- Can’t differentiate its “commodities” from competitors unless the “process” is improved (Lean, 6-sigma)
- Won’t support disruptive modernization without:
  - Independent leadership
  - External resources (corporate or government)
  - Customer knowledge/buy-in
Success – Nano in Sports

Who said it’s “disruptive” – avoid frontal assault
- Don’t hype nanotechnology
- Existing products work okay – this is just better
- If it’s disruptive, let that be proven in future

Engage suppliers in modernization strategy
- Sell as better performance/quality at lower cost.
- Use positive aspects of new technology vice risks – acquire/show real data
- Worst vice is overselling!!! Credibility is Key!!

Interview, Dr. Tom Cellucci, Pres/COO, Zyvex Corp.
Nanomaterials Hit the Field
Nanomaterials Transition to DOD

- Multifunctional Nano-Structures
  - Ultra Light Weight
  - Strength, rigidity
  - Producibility
  - Mission Adaptability

Courtesy of Dr. Les Kramer, LMMFC
Success – JSF Lift Fan

- Hit press in ’01 but lean team began in ‘87: USMC, DARPA and Lockheed
- USMC knew its objectives – stayed in-charge
- DARPA supported before PM had IRAD $
- Skunks had 50 concepts – PM picked “lift fan”
- Company liked “lift engine”; team/competitor influenced final “lift fan” decision
- Sold concept to engine teams thru AF code
- AF added strong staff/tech support (AQR)

Interview, Dr. P. Bevilaqua, NAE
Skunk-PM, Invented Lift Fan
**DOD Developer is Key**

- Engage the internal R&D community
  - Access to all information (SAP, proprietary)
  - Low cost to sponsor
  - Aids planning and avoids tech surprise
  - Quick response capability
  - Inherently governmental tasks
  - Corporate Memory
  - Continuity Throughout System Life Cycle

- Refresh RDECs to ensure in-house capabilities across new tech domains

Reference: Mike Marshall, “From Science to Seapower”
Industry Needs DOD Developer to:

- Fund tech base for set of designated disruptive technologies – enliven “Reliance”
- Hire/support new S&Es to ensure knowledge of and access to disruptive tech domains (best/brightest)
- Engage Industry/DOE/HSARPA/NSF to ensure input on new system options (w/DARPA)
  - Assess all information (SAP, proprietary)
  - Assign joint monitor (Service lab, other)
  - Coordinate on budgets, goals, performance.
  - Co-develop transition strategies
  - Perform inherently governmental tasks
  - Act as corporate Memory
  - Support Product Across System Life Cycle
Warfighter is Critical

• Provides insights on what capability is needed
• Identifies value/impact of potential improvements
• Envisions when such improvements would be needed
• Doesn’t understand the technology – needs explanation
• Thinks he knows what he needs – but hasn’t been exposed to disruptive potential of new technology/capability
• Might be wrong customer, so joint and multifunctional inputs needed (might be better suited to MP than SOF)
• Can’t articulate all of his knowledge – simple user surveys are of little value – prototype test results may be too late

“If I’d asked my customers what they wanted – they would have asked for a faster horse”  Henry Ford
Industry Needs Warfighter to:

- Include industry in Combat Developments
  - Immediately allow access to Lessons Learned
  - Integrate mod/sim, prototyping as tools
- Train cadre to understand capability options
  - Make system OR/SA trades (CAIV, AOA, COEA)
  - Make hard-nosed decisions early in process – drop dumb stuff sooner-the-better
  - A-TRADOC and JFCOM have good approaches
- Use concept of “pilot” operations in field to evaluate new hardware
- Be willing to revise TOEs, Tactics, Techniques and Procedures to achieve improvements
Industry Must: (1)

- Develop accountability for Independent leadership of disruptive transitions (COO, CTO, other)
- Allocate resources to evaluate disruptive tech
- Shield disruptive technologies from internal trades
  - Don’t assign tech to “disrupted” system organization
  - Hire/empower engineers with access to new ideas
  - Build a cadre of “skunks” for mission areas
- Develop credibility with government
  - Understand warfighter problem - communicate
  - Prove the evolution/revolution possibility
- Convince BOD/shareholders that long term survival requires disruptive tech transition
Industry Must: (2)

- Establish Skunkworks-like organizations at corporate level with charters like DARPA
- Develop world-class virtual collocation, simulation, continuously validated, to model disruptive features (scalability, etc.)
- Tie above activities to warfighter and DOD developers, including DOE/Others
- Fully explore the potential of new tech to improve capabilities in DOD mission areas
  - Whether profitable to industry or not
  - Include subcontractors/suppliers/innovators
- Allow failure – assessing evolution/termination
Summary/Conclusion

- Transition of disruptive technology is difficult and if not expedited could negatively affect modernization
- Industry can successfully catalyze valuable disruptive capability with the help of warfighter and developer
  - Warfighter to brainstorm and assess potential
  - Developer to provide tech/business interface
- Industry must realize that success is not guaranteed by only market share and volume growth

“I must work longer and harder each day to weave a world in which I can live. Survival is the play and I want the leading role”,
Callahan, Adrift – 76 Days Lost at Sea
QUESTIONS
OR WRAP-UP AND LUNCH, YOUR CALL?