

Supplier Audits at Raytheon Missile Systems [RMS]

Materials, Processes & Producibility [MP&P]
RAYTHEON MISSILE SYSTEMS [RMS]

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September-2014

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Supplier audit perspective from non-quality function participant

Speaker

- Senior Principal Engineer in Materials, Processes and Producibility Department in RMS-Tucson
- Polymers/Plastics/Rubbers Subject-Matter-Expert
- Rubber Engineering Lead for SEAC
- ASQ CQA since 1994; CQE since 1995
- Worked as Senior Quality Associate responsible for audits & raw material specs at Huntsman Polymers TX from 1998-2001
- Participated in ~30 supplier audits in last 5 years

Extensive supplier auditing experience

RAYTHEON CORPORATION

- Technology and innovation leader specializing in defense, security and civil markets
- 2013 sales [\$24 billion]
- 73,000 employees
- Vision: To be the most admired defense and aerospace systems company through our world-class people, innovation and technology
- Sells products & services in 80 countries
- Offices in 19 countries
- Revenue outside USA: 26% of 2012 total
- Listed on NYSE for 62 years; symbol “RTN”

Global defense & aerospace company

HISTORY

- Founded on 7 July 1922 as American Appliance Company by Vannevar Bush, Laurence Marshall & Charles Smith
- 1st innovation: S-gas rectifier tube; eliminated expensive batteries powering home radios
- World War II
 - Supplied 80% of magnetron tubes in US & British radars
 - Sea Going SG Microwave Radar on ships
- Percy Spencer discovered microwave cooking
- 50's-60's
 - Lark missile knocked test drone out of air
 - New generation: Sparrow & Hawk

HISTORY [contd.]

- Apollo to the moon
 - Built computer that guides space vehicles
 - Microwave tube transmitted radio & TV signals
- Vietnam Era
 - AIM-7F Sparrow
 - Hughes Tube-launched Optically-tracked Wire-guided [TOW] anti-tank missile
- Persian Gulf War
 - Patriot intercepted Iraqi Scuds; 1st hostile ballistic missile intercept

DIVISIONS

- MISSILE SYSTEMS: world's premier missile maker, providing defensive and offensive weapons for air, land, sea and space, including interceptors for U.S. ballistic missile defense. The business also builds net-enabled battlefield sensors and includes Raytheon UK.
- INTEGRATED DEFENSE SYSTEMS: specializes in air and missile defense, large land- and sea-based radars and systems for managing command, control, communications, computers and intelligence (C4I). It also produces air traffic management systems, sonars, torpedoes and electronic systems for ships.
- SPACE & AIRBORNE SYSTEMS: builds radars and other sensors for aircraft, spacecraft and ships. The business also provides communications and electronic warfare solutions and performs research in areas ranging from linguistics to quantum computing.
- INTELLIGENCE, INFORMATION & SERVICES: provides cybersecurity products and services. It also offers a full range of training, space, logistics and engineering solutions for government and civilian customers.

4 divisions

Raytheon Missile Systems [RMS] - Tucson

- RMS headquartered in Tucson
- Largest private employer in Southern Arizona
- Locations: Huntsville, AL; East Camden, AR; Tucson, AZ; Rancho Cucamonga, CA; Louisville, KY; Albuquerque, NM; and Farmington, NM., Oklahoma, Texas, United Kingdom
- 14,000 employees [22% of total]
- \$6.6 billion [29% of total]
- Started in Tucson in 1951 as Hughes Aircraft Company

Missile Systems is about 25% of entire corporation

Raw Materials & Suppliers

- 2012 Annual Report
 - “dependent upon the delivery of materials by suppliers, and the assembly of major components and subsystems by subcontractors”
 - “must comply with specific procurement requirements which may, in effect, limit the suppliers and subcontractors”
 - “In some instances....dependent on sole-source suppliers”
- Many parts come pre-installed in assemblies
- Hence, supplier quality is critical

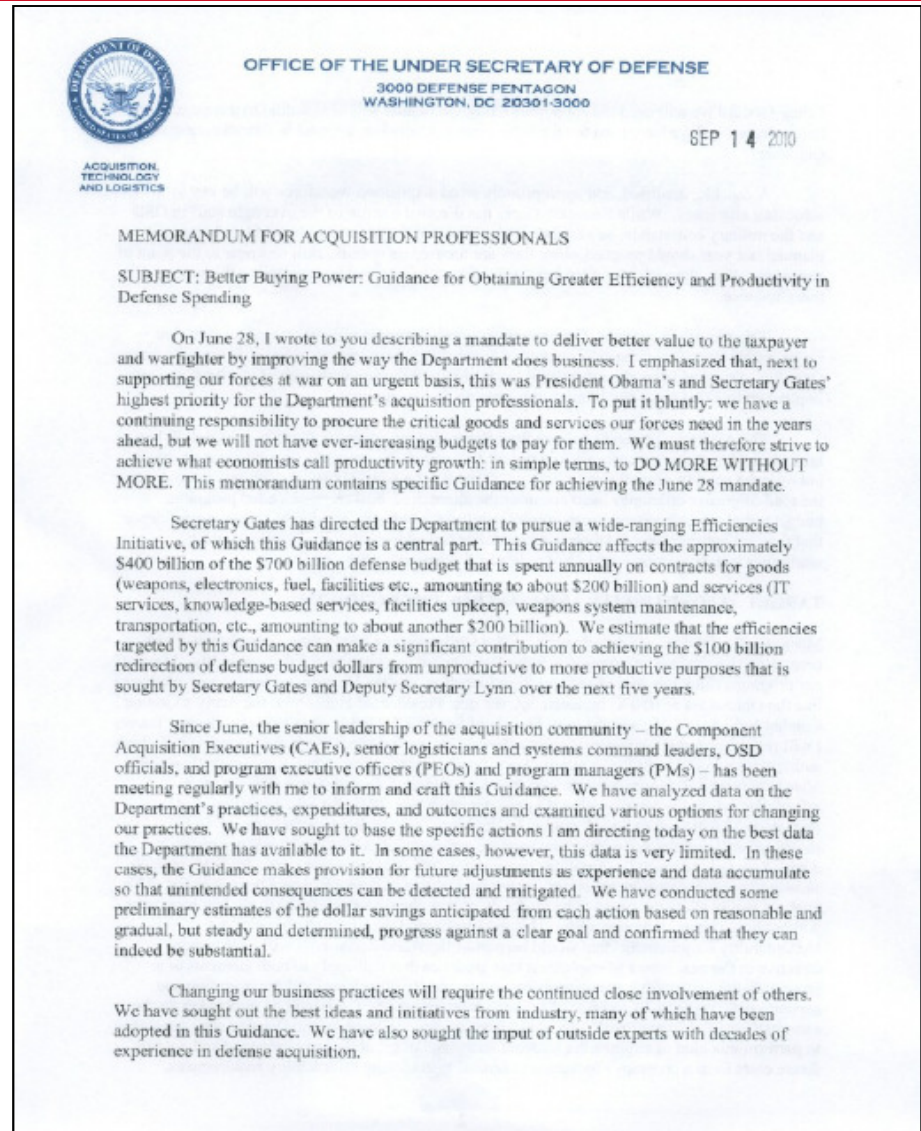
Critical role of suppliers

Ashton Carter Memo 9/14/2010

Ashton Carter, the Under Secretary of Defense for Acquisition, Technology & Logistics, sent memo to all Acquisition Professionals

17-page letter covers five key areas

- Target affordability and cost growth
- Incentivize productivity and innovation in industry
- Promote real competition
- Improve trade craft in service acquisition
- Reduce non-productive processes and bureaucracy



Q1 2011 Investors Call

“Raytheon's **supply chain** is quickly becoming a **competitive differentiator** and **strategic advantage** for the company. It is an integral part of our focus on **delivering strong operating performance** for our shareholders and the best value for our customers. Initiatives such as our center-led and cross-functional approach to **supplier selection** and **centralized procurement** enable Raytheon to **maximize supplier-partner relationships** while **minimizing variation and risk** in our supply base. In addition, an enterprise services approach harnesses the collective strength of Raytheon efficiently while at the same time moving us forward with **speed and agility.**”

Bill Swanson

Chairman and CEO [retired 2014]

Raytheon Company

SEAC

- SEAC = Strategic Enterprise Aligned Commodities
- Corporation wide program
- Drive procurement from division level to corporate level: economies of scale
- Consolidate supplier base
 - In plastics & rubbers, going from 800+ to 16 for new programs
 - 700+ suppliers had 3-year sales of < \$10,000
- About 26 SEAC corporate-wide teams for commodities such as connectors, CCA, machining, etc.
- Company-wide agreements [price, T&Cs]
- Preferred Suppliers subject to qualifying audit
- Legacy procurement for existing programs remains unchanged

Supplier base consolidation

What is RESA?

RESA (Raytheon Enterprise Supplier Assessment)

- **Definition** - Enterprise process and tool for assessing supplier's capabilities which promotes educated and informed supplier decisions.
- Supply Chain, Mission Assurance, Program Management, and Engineering together perform team assessments to make better supplier decisions and mitigate supplier risk.
- There are eight assessment checklists that Raytheon utilizes to proactively mitigate supplier risk
- Deployment – RESAs are performed by the all RTN divisions with a cross-functional team consisting of Program Management, Supply Chain, Mission Assurance, and Engineering.
- Enterprise Supplier Risk Tool (ESRT) is a supplemental tool to identify suppliers with risk concerns & determine which RESA to perform to proactively mitigate risks.

RESA Chapters

- 0: assess Quality Management System for compliance to standards; when no 3rd part registration [ISO-9000, etc.]
- 1: New supplier; Initial Total Business Assessment for potential supplier
- 2: Existing supplier; If supplier can meet new requirement
- 3: Total Business Assessment [TBA]; health of new supplier; before approving supplier
- 4: Pre-work Authorization Review; contractual requirements alignment
- 5: Post-Award Review; compliance to requirements prior to producing 1st piece
- 6: Periodic TBA; health of existing supplier
- 7: Product & Process Verification [PPV]: assess key processes

Example of Chapter-1

- New injection molding supplier in Minneapolis
- Multi-disciplinary team: Supply Chain, Quality, Engineering
- Multi-division team: All divisions represented
- One-day audit
- Overview; difficult to assess processes in depth with large team and limited time

Example of Chapter-2

- Objective: Determine if existing gasket supplier should be added to Preferred Supplier List
- Multi-disciplinary team: Supply Chain, Quality, Engineering
- One-day audit
- Difficult to assess processes in depth
- Required return visit

Example of Chapter-7

- Objective: Determine if existing seals supplier quality system robust enough for Supplier Managed Inventory
- Multi-disciplinary team: Supply Chain, Quality, Engineering
- 2-3 day audits; sometimes multiple locations
- In-depth assessment of processes
- Continuing surveillance every year
- Pronounced improvement in 3 years

Benefits of RESA audits

- Data drive decisions
- Improved communications
- Reduced Risk
- First hand assessment of supplier compliance
- Process Improvements
- Information sharing across divisions
- Supplier alignment across divisions, leading to supplier base consolidation

Supplier audits have many benefits

SHARP

- One intra-net tool to archive & document audit reports
- Available across enterprise & all divisions
- Has 12,183 entries for Raytheon Corporation; 6120 for RMS; as of 8-28-14
- Tools & Resources
 - Data Analysis capabilities [Pareto charts, etc.]
 - Track action items

Lessons Learned

- PPV required for in-depth supplier quality & process assessment; drives supplier improvement
- PPV provides assurance that elimination of receiving inspection by moving to Supplier Managed Inventory does not increase risk unacceptably
- Availability of resources & appropriate functional personnel with audit expertise a challenge
- 1-day audits insufficient to thoroughly review supplier processes

Properly planned audits can result in cost reduction

ACKNOWLEDGEMENTS

- Pat Gorman for extending invite and providing opportunity
- Following for helping get RMS permission to present
 - David Smith of MPE
 - Jeff Vollin of Advanced Technical
 - Sherry Botos of Legal
 - John Patterson of Corporate Reputation
 - Rhonda Stock-Stanage of Export Control
 - Chris Cottrell of Global Security Services
 - Charles Kennedy of Public Release