Supplier Quality Program

Electric Boat Supplier Quality

Electric Boat Supplier Quality is committed to working with our suppliers to provide the highest quality materials used to construct the most advanced nuclear submarines in the world. Our submarines operate in the harshest environments without support to complete critical military operations so they must operate the first time, every time.

Together we deliver the advantage that protects our sailors, our families and our freedom.

Quality Commitment

Electric Boat sets high standards for our suppliers to ensure product quality

"Quality is the totality of features and characteristics of a product and/or service that bear on its ability to satisfy a given need."

Expectations & Requirements	Performance	Continuous Improvement
• Robust Quality Management System • Management Accountability for Quality Excellence • Strong Quality Culture • High-Quality Processes, Procedures and Training/Qualification Programs	• Consistently Meets Contract Requirements • Measures Quality Performance • Timely Response to EB Supplier Corrective Action Requests/Inquiries • Clear Recovery Plan When Performance Does Not Meet Expectations	• Self-Assessment Program • Actionable Trend Analysis • Effective Root Cause Corrective/Preventive Action Program

Suppliers must have unyielding commitment for quality performance to deliver high quality material meeting purchase order requirements

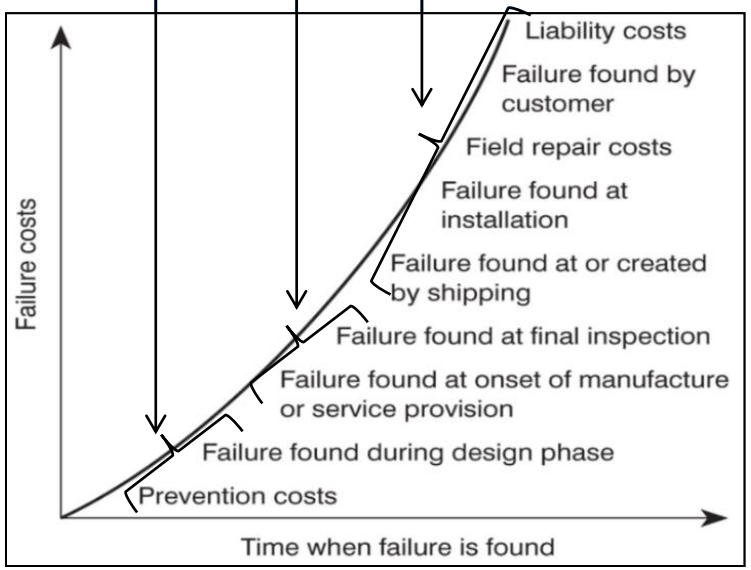
Management Systems Applied and Business Performance

1, 3, 8 Rule

1x Prevention Costs
- Prevention costs are those costs that occur when a company is performing activities designed to prevent poor quality in products or services.
  - Quality planning, education, preventive maintenance, product design reviews.

3x Appraisal Costs
- Appraisal costs are the costs associated with measuring, evaluating, or auditing products or services to make sure that they conform to specifications or requirements.
  - In-process inspection, incoming inspection, audit, product evaluations.

8x Failure Costs
- Failure costs occur when the completed product or service does not conform to customer requirements.
  - ***Internal Failure Costs*** are those costs associated with product non-conformities or service failures found before the product is shipped or the service is provided to the customer.
    - Rework, scrap, repair, corrective actions
  - ***External Failure Costs*** are those costs that occur when a nonconforming product or service reaches the customer.
    - Returned goods, liability costs, penalties, complaints



∞x Intangible Costs
- Intangible costs are the hidden costs associated with providing a nonconforming product or service to a customer. They involve the company's image.
  - Customer dissatisfaction, loss of trust, loss of ship

*Summers, Donna C.S. "Quality",Pearson, 2016

Why First Time Quality Matters

Getting it right the first time is what keeps our end users safe.

Someone once said there's just enough room on a submarine for everything except one mistake. In our product's operational environment, the ocean will look to exploit that mistake. It can happen on day one or in the 40th year of the ship's adventures.

There is a 'Sacred Trust' between us, the shipbuilder, and the submariner that ensures their equipment functions each and every time they need it.

Why First Time Quality Matters

When we achieve excellence, submariners come home.

– Chris Yaras, Quality Ambassador

(Picture above post collision pictures from the USS SAN FRANSCICO 2005 and USS HARTFORD 2009)

Supply Chain Management Process Overview

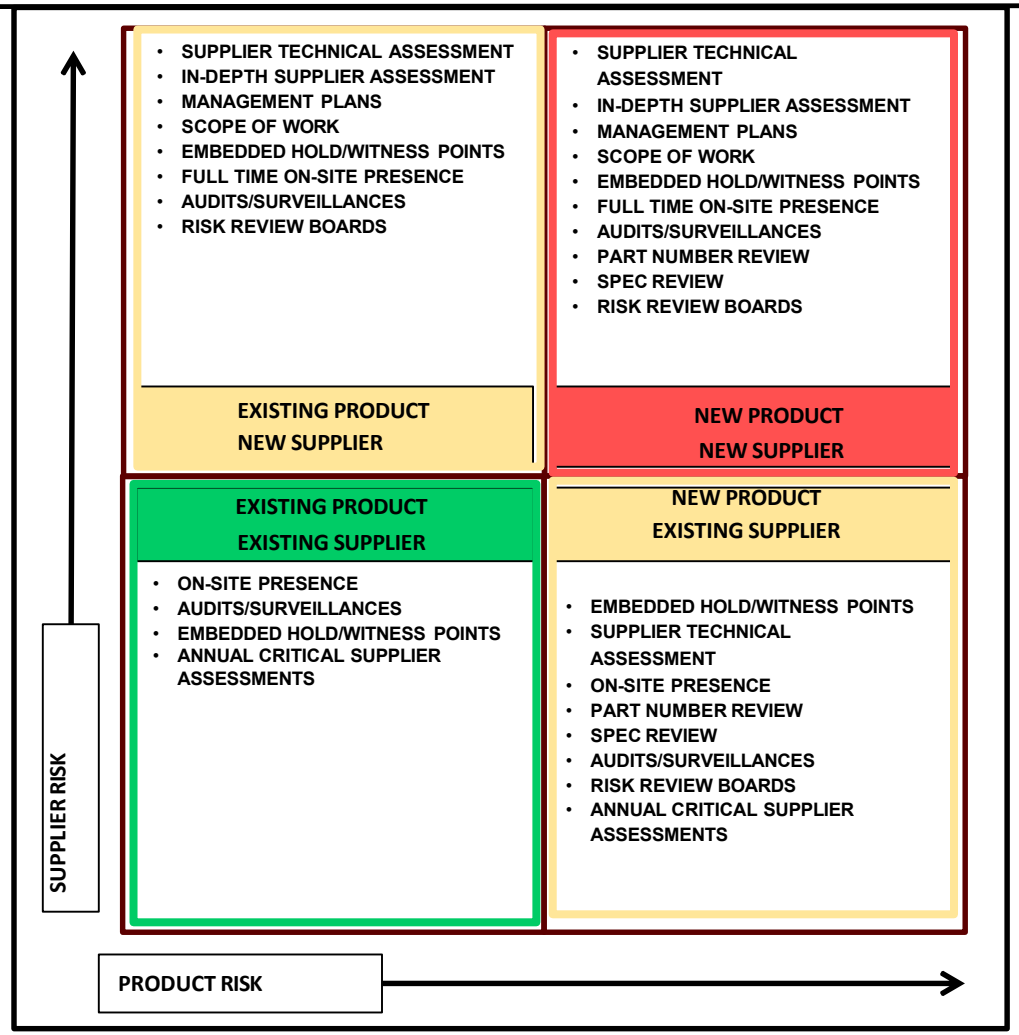
EB Supply Chain Management Defined in 5 Phases

Design & SOW	Pre-Award (Bidder Selection)	Readiness (Selected)	Execution (Prime & Sub-tier)	Validation
Define critical inspection attributes and hold points	Participate in supplier assessment of processes and capabilities	Define additional required oversight for selected supplier or sub-tier suppliers	Measure and monitor technical performance of supplier and sub-tier suppliers assign corrective action as required	Approve supplier objective quality evidence (certification package and RT film)
Define sampling and inspection methods	Participate in the identification of supply base risks and evaluate need to develop new suppliers	Develop action plans to improve supplier readiness	Identify, report and mitigate supplier and sub-tier risks as the arise	Validate supplier is ready for inspection
Define certification package requirements	Participate in supplier technical assessments		Verify supplier process controls and improvements	Final inspection and acceptance
	Define supplier development and actions		Electric boat subject matter experts on site as necessary	
	Assess and validate supplier and sub-tier capability and capacity (STA, capacity assessments, risk mitigation actions)		In-process audits, inspection and oversight	
Actively monitor supply base performance for risks and proactively take action to mitigate (ISAs, in-process audits, etc.) Communicate supply base risk to suppliers to increase awareness and mitigate efforts				
	Supply base development Develop and maintain a supplier culture of quality and performance			
	Monitor supplier's quality performance and take actions to improve performance			

GENERAL DYNAMICS
Electric Boat

Tools Used to Address Supplier and Product Risk

Product vs. Supplier Risk Matrix



Supplier Qualifications

Levels of Qualification as an Electric Boat Supplier

- Electric Boat has various levels of qualifications to which suppliers are assessed.
  A few examples are:
  - MII-I-45028 (Will be subset by the end of 2026)
  - MIL-Q-9858A
  - ISO 9001
  - EB 2678
- Qualification in critical processes starts with a business need:
  - Welding
  - Non-Destructive Testing (NDT)

Approved Supplier List

Electric Boat Supplier Quality maintains list of suppliers who have met additional requirement set by Supplier Quality Engineering, these list lets supplier uses a supplier on the list as a sub-tier without the need of additional audits or actions. The list are available on supplier tab of the Electric Boat Website: https://gdeb.com/suppliers/10_quality/ under programs.

Approved Suppliers List:

- Trusted Supplier – approved to provide discrete electronic parts, despite not having a contractual agreement with the Original Equipment Manufacturers (OEM)
- Counterfeit - required to have and maintain a counterfeit electronics mitigation policy
- Approved Level I (However, a supplier can still provide Level I material without being on the approved level I list)
- Forging List
- Foundries Approved to Produce 70/30 Copper Nickel Fitting Casting list

Weld and Non-Destructive Testing (NDT)

- Some suppliers have Welding and NDT requirements invoked on the material they provide to Electric Boat. Standard clauses SC 60-77 and SC 60-67, invoked via purchase order, outline the procedure approval requirements for Welding and NDT respectively.
- Electric Boat Welding and NDT Engineering, D341, is cognizant of all vendor related welding and NDT matters, including but not limited to: vendor welding and NDT procedure approval; specification clarification; providing Subject Matter Experts (SMEs) in welding and NDT for In-depth Supplier Assessments (ISAs); vertical audits; etc…
- D341 has also worked to maintain an external website with resources for suppliers such as:
  - "Lessons From the Shipyard" bulletins for welding lessons learned;
  - NDT bulletins for NDT lessons learned;
  - Aides for procedure submittal to increase the likelihood of approval;
  - A list of past and future topics for welding supplier conferences, held periodically to focus on common issues identified by D341 Welding Engineering;
  - The website can be found at: https://gdeb.com/suppliers/12_weld_ndt/
- D341 also assists in the scorecard process by generating Welding or NDT specific assessments for some suppliers.

Supplier Quality Management Process

Quality System Requirements

Electric Boat may require suppliers to have quality management processes commensurate with MIL-I-45028 or MIL-Q-9858A, or with ISO9001 with NAVSEA supplemental technical requirements (STR).

- MIL-I-45208 is a series of requirements for the development and maintenance of a contractor's inspection processes. The requirements within the MIL–I specification pertain to any and all inspections and tests that are required to prove product conformance.
- MIL-Q-9858 requires the formation of a quality control program to promote product quality conformance through oversight of manufacturing, supply chain and other processes. The quality control program is required to include control processes that address design control, product identification & traceability, servicing and the expectation to use statistical techniques to understand the performance of the quality control program.
- NAVSEA STRs are additional requirements placed on ISO9001:2015 suppliers who do not base their QMS on either MIL-I-45208 or MIL-Q-9858A, as specified on the Purchase Order Line Item.

Electric Boat Specification 2678 Quality Control Requirement for Procured Material (EB 2678), Rev Q and Latest Revision

EB 2678 is invoked through standard clause (S/C) 60-29 to describe required oversight practices in support of other quality specifications on the purchase order:

- Official Records
- Drawing and Document Control
- Design Changes
- General Material Control
- Nonconforming Material Control
- Manufacturing and Special Processes
- Inspection
- Corrective Action System
- Audits

- Material requirements are found in Purchase Order documents
- All revisions of EB2678 effective for the material can be determined by clicking the hyperlink in the Purchase Order and can also be found on the Supplier tab of the Electric Boat webpage
- Strict adherence to quality, oversight and material requirements of the Purchase Order is required
- Suppliers are advised to establish and maintain an auditable Quality Management System (QMS) to ensure the quality and adequacy of the material or service is provided.

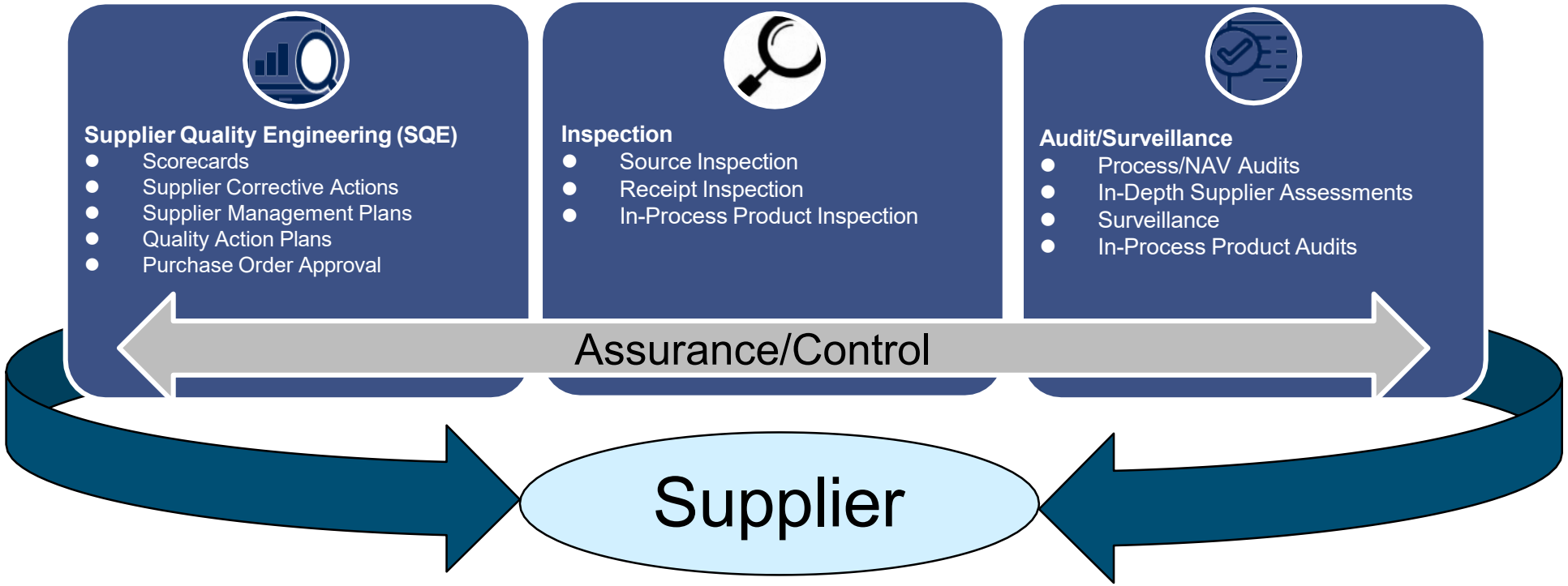
Supplier Quality Questionnaire

The Supplier Quality Questionnaire is a self-assessment of the supplier operational capabilities and alignment to Electric Boat requirement. The questionnaire covers various aspects of the suppliers operation, including company's quality systems, contract review process, EB-2678 compliance, testing, calibration, welding, non-destructive testing (NDT), heat treatment and other related areas. Suppliers responses will significantly contribute to better understanding their capabilities, support our efforts to mitigate risk, and improve overall quality within the industrial supply base.

An Electric Boat purchasing and/or supplier quality personnel may request a supplier to complete a Supplier Quality Questionnaire. Completion of Supplier Quality Questionnaires should be returned to EBSQReports@gdeb.com.

Managing Supplier Quality Performance

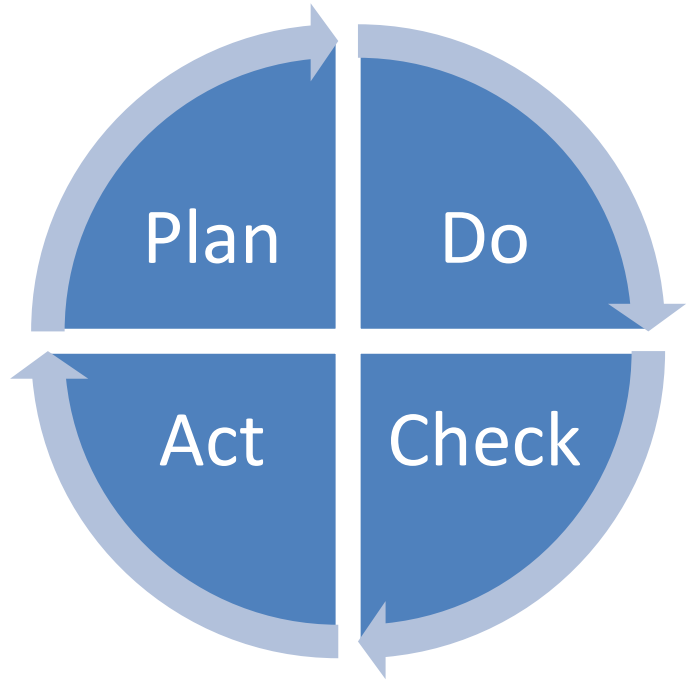
Supplier Quality organization lines of effort work together to measure, assess and address suppliers' quality performance



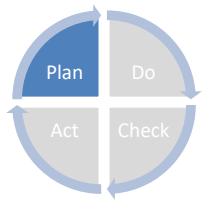
Electric Boat Integrated Supplier Management Cycle

Supplier Management Cycle is driven by:

- PLAN - Development of Supplier management plans
  - Assessment of current work
  - Assess qualification levels
  - Identification of high risk processes
  - Identification of quality actions to close gaps in capabilities to requirements
  - Identification of types of inspection, audits, surveillances required to mitigate risk
- DO - Execution of Supplier Management Plans
  - Execute inspection, audit, surveillances as defined
- CHECK- Assess results
  - Inspections, audit, surveillances
  - Vendor Information Requests
  - Supplier Corrective Action Reports
  - Post delivery non-conformances
- ACT - Revise supplier management plan based on performance and develop Quality Action Plan (QAP)
  - Issue corrective actions to resolve system, process, or product non-conformances as required
  - Issue Supplier Scorecards to highlight areas of opportunity for suppliers to take action to influence positive performance

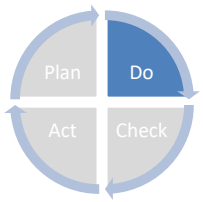


Monitoring Suppliers Using Supplier Management Plans



- Supplier Management Plans are developed by Supplier Quality Engineers to document:
  - Information related to supplier capabilities and quality certifications
  - Gaps, performance trends, and risks
  - Action plans for supplier development
- These plans are also used by Supplier Quality Engineers as:
  - A baseline to measure supplier growth
  - The basis for Supplier Quality Engineer and Audit Group scheduling for supplier visits
  - A platform for supplier assessments
- Supplier Risk profiles and Supplier Quality Questionnaire provide vital input to Supplier Management Plans

Auditing and In-Process Inspections to Verify Procedural Compliance

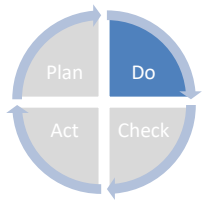


Audits/Surveillance are tools used to monitor process and work execution

- **Audits are assessments of:**
  - Baseline supplier health
  - Quality Management System effectiveness
  - Supplier's Quality Culture
  - Conformance to contractual requirements
  - Execution of work as a result of processes, procedures and QMS
- **QMS/NAV Audits focus on supplier processes**
  - Audits performed periodically
  - Example topics: Material Control, Inspection & Testing, Calibration, Non-destructive Testing, Documentation and Data Control, etc.
- **In-Depth Supplier Assessments (ISA)**
  - Conducted on critical suppliers manufacturing
  - Focus processes through assessment of the supplier's performance of work
  - In-Process product inspections are performed to witness procedural compliance and process controls
  - Participation may include subject matter experts, government representatives and/or Newport News Shipbuilding

Audit and Surveillance results inform supplier quality scorecard process and risk assessments.

In-depth Supplier Assessments (ISA)

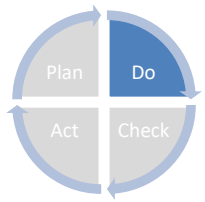


How to best prepare:

- Thoroughly read through the Precepts Letter and let the Team Lead know if there are any concerns, areas which may not be supported, or work available to be witnessed.
  - Example: Testing is included as one of the focus areas but all testing is done by a sub-tier supplier, or there is no testing of Electric Boat products scheduled for the week of the ISA.
- Provide precepts materials back to the Team Lead by the due date. This helps the auditors prepare and helps the ISA run smoothly.
- Look over internal audits and/or corrective actions to know what issues are currently being worked. If there is an open, documented issue, ISA members like to see the steps being taken to resolve it.
- Look over the contract documents to ensure the requirements are flowed down to work instructions, sub-tier suppliers, etc.
- Communicate with Team Lead early and often.
- Provide points of contact for each one of the groups listed in the Precepts Letter.
  - It is recommended to have one point of contact per group so the ISA runs smoothly and both teams can work together efficiently.

For more information on preparing for an ISA visit our Supplier Website to view Supplier Information Bulletin article about preparing for an ISA at:
https://gdeb.com/suppliers/10_quality/attachments/SIB/SIB_2024_Volume_8_Issue_2.pdf

Schedule of an ISA



ISAs are normally conducted Tuesday-Thursday, with a close out meeting on Friday morning.

Tuesday-Thursday

•On Tuesday, the team will ask for a quick safety and familiarization tour of the facility (approx. 30 mins)

•Groups will perform shop floor audits of in-process work on Electric Boat product and review procedures and Objective Quality Evidence (OQE) for supporting programs

•Findings will be discussed in detail with the supplier as the week progresses

Friday

•The team formally discusses all draft cards with Electric Boat and the Supplier before the final out brief

•Formal out-brief with Electric Boat, Newport News(if applicable), Government, and Supplier

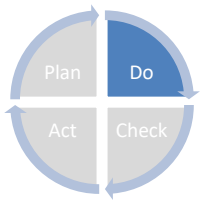
After

•ISA team will resolve any supplier concerns not adjudicated prior to the final out brief

•Final ISA report should be issued approximately 3 weeks after the ISA

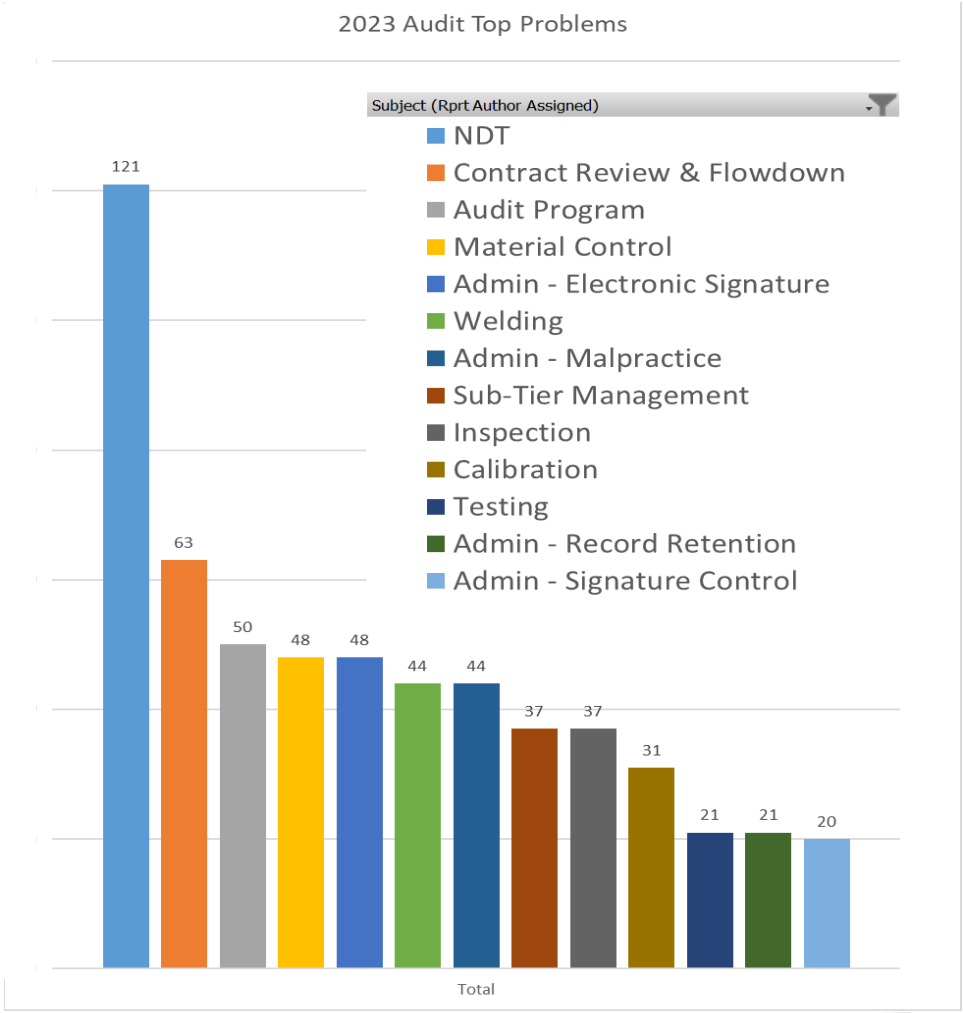
•Audit Cards act as SCARs. Audit Cards that require a response will be loaded into Oracle and sent to the supplier via iSupplier. The supplier should provide ISA responses to the cognizant SQE via Oracle iSupplier

Early Problem Identification/Common Audit Findings

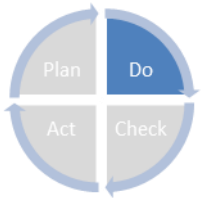


Some findings are common across the supply base. Here are some of our most common findings:

- Missing and/or out of date calibration status on tools, including master calibration sets. Lapses in calibration statuses.
- Flowing down requirements of Electric Boat Specification 2678 and Contract requirements to work instructions or sub-tier suppliers.
- Electronic signature not properly controlled and/or identified.
- Electrostatic Discharge procedures are not approved and/or not being followed.
- Temperature Uniformity Surveys and System Accuracy Tests lapses or not being performed.
- Inspector stamps not being properly controlled.
- Comingling of Level N and Level I parts.
- Sub-tier suppliers for Level I work are not being audited.
- Corrective and/or preventative actions not being resolved.
- The administration of the welder workmanship training and/or nondestructive testing program(s) do not meet the minimum requirements.
- Personnel certifications do not meet the minimum requirements for qualification per the documents governing certification.
  - Common in the areas of Welding and Nondestructive Testing (NDT), Test and Inspection, and Quality procedures.



Welding and NDT ISAs and Vertical Audits



D341 Welding and NDT Engineering's role in the ISA process involves observing in-process work at a supplier's onsite location and reviewing their internal documents and procedures. Prior to the audit, D341 will request a number of documents and procedures for review via a precepts letter sent out by supplier quality.

- D341 Welding Engineering also plans and conducts the Navy Process Audit (NAV22 Audit) for Welding. The NAV22 Audit supports the Supplier Quality (SQ) supplier management process and contributes to the Navy Supplier Audit Program (SAP) by periodically monitoring and assessing the performance of external companies that supply EB with the materials needed to support the consD341 Welding and NDT Engineering's role in the ISA process involves observing in-process work at a supplier's onsite location and reviewing their internal documents and procedures. Prior to the audit, D341 will request a number of documents and procedures for review via a precepts letter sent out by supplier quality.
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- For strategic sourcing suppliers, it may determined that a vertical audit is necessary in order to ensure that vendors providing critical hardware have practices which are compliant to the specifications invoked via purchase order.
    - D341's role in vertical audits involves surveillance of production welding and NDT. Electric Boat welding SMEs will observe in-process welding while an Electric Boat Level III NDT Examiner observes the supplier conduct Technical Performance Evaluations (TPEs) on supplier inspectors re-inspecting Electric Boat product.

Letter of Advisement (LOA)

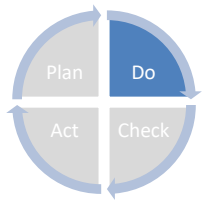
Electric Boat Specification 2678 invoked via S/C 60-29 requires suppliers to notify the purchaser (Electric Boat, Newport New, Etc.) of contract non-conformances and /or latent defects discovered on delivered material. LOA's are required for all non-conformances and latent defects regardless if the supplier believes the form, fit, or function of the hardware is impacted.

It is imperative that suppliers provide prompt notifications of delivered non-conformances.

Appendix E of EB2678 provides a template, including the necessary information required as part of this notification.

For Electric Boat procurements, LOAs should be submitted via iSupplier. A job aid on how to submit an LOA via iSupplier is available on our external site. If you experience issues or have questions about the submission process, contact your EB Buyer, or cognizant Supplier Quality Engineer (SQE).

In-process and Final Inspections Are Performed to Validate Product Compliance

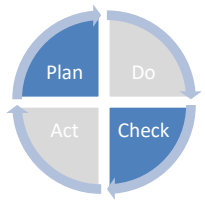


- Certification Package
  - Required OQE, as defined by purchase order requirements, is submitted via Oracle iSupplier for approval prior to hardware inspection to validate contractual compliance through documentation review
- Hardware Inspection
  - Hold points performed on in-process work to validate execution steps and reduce risk
  - Source Inspection performed at supplier's facility prior to shipment to EB
  - Receipt Inspection performed upon receipt of material at EB facility
  - Inspection results inform supplier quality scorecards and supplier quality performance

Certification of material is the responsibility of the supplier. Suppliers are expected to deliver high quality certification packages and material.

Supplier Quality Scorecard

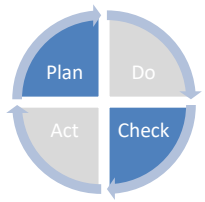
What is a Supplier Quality Scorecard?



- Assess the supplier's ability to perform to Electric Boat's requirements during the planning and check phase of the management cycle
- Determine appropriate actions to take including:
  - Supplier Quality Action Plans (QAP)
  - Frequency of Electric Boat Assessments and Audits
  - Quality and Procurement Status
- Conduct informed conversations with suppliers
- Provide information and assessments to help determine:
  - Procurement decisions
  - Risk mitigation actions

Total Score (Max 100 pts)	Classification
90 and above	Green – Satisfactory
75-89	Yellow –Marginally Satisfactory
74 and below	Red –Unsatisfactory

Supplier Quality Scorecard Evaluated Attributes



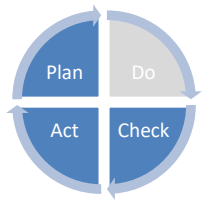
- The assessment and scoring methodology is both quantitative based on quality data and qualitative based on interaction with the supplier.

- Areas evaluated include:
  - Supplier reported in-process non-conformances (Vendor Information Requests)
  - Source & Receipt Inspection acceptance rating
  - Post delivery non-conformances (ERs/CNs)
  - Supplier Corrective Action Reports (SCARs)
  - Level of Confidence assessment by cognizant engineer

Positive or negative adjustments may be made to scores based on holistic evaluation of complexity of products and supplier performance

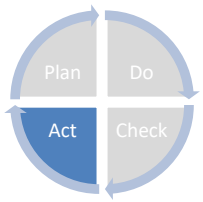
Supplier Quality Scorecard

EB and Supplier Actions Based on Score



Green – Satisfactory	• Review of assessment with Supplier's Quality Management • Discuss opportunities for process enhancements to sustain performance • Communicate concerns that may be indicators of declining performance • Status the effectiveness of ongoing and completed corrective actions • Continue to perform oversight per standard practices	• Favored for procurement awards • Reduced inspection frequency • Normal depth/frequency of audits
Yellow – Marginally Satisfactory	• Review of assessment and Quality Action Plan (QAP) with Supplier's Management and EB SMEs as appropriate • Communicate areas of improvement and document via SCARs, if necessary • Establish a cadence of regular communication with the supplier on the development planned actions and the effectiveness of ongoing and completed corrective actions • Develop an enhanced oversight plan to monitor areas of needed improvement	• Limited procurement • Increased inspection frequency • Increased depth/frequency of audits
Red – Unsatisfactory	• Require meeting with the Supplier's and EB's Senior Management teams on assessment, problem statements and Quality Action Plan (QAP) • Formally communicate that the supplier is not meeting expectations via SCAR and require the supplier to take action to correct • Establish a cadence of regular communication with the supplier's leadership on their status to the improvement plan • Develop an enhanced oversight plan to monitor effectiveness of plan and ensure quality product is delivered	• Reduced or stop procurement awards • Increased inspection frequency • Increased depth/frequency of audits

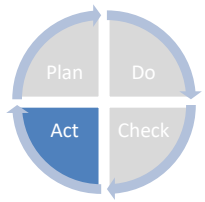
Supplier Corrective Action Reports (SCARs)



- SCARs are issued for supplier non-conformances and systemic issues
  - Sources include, but are not limited to, Inspections, Audits, Scorecards and trends
- SCARs are used in the supplier quality scorecard assessment
- Level and formality of response is dependent upon severity of non-conformance identified
- Communication of SCARs to suppliers occur electronically via iSupplier notification for all registered suppliers.

SCAR Level	Definition	Actions
Low (Level 3)	Minor administrative error or hardware deficiency identified	Corrective Action, OQE of action (s) taken
Medium (Level 2)	Major problem (A problem or trend that, if not found corrected, could result in a High Level problem) or trend identified	Extent of Finding, Corrective Action, Root Cause Analysis Analysis, Preventive Action, Evaluation for impact on previously delivered material and effectiveness of Corrective/Preventive Actions taken, OQE of action (s) taken
High (Level 1)	Critical problem (A problem or trend that has or could result in significant rework, significant environmental hazard, radiological incident, equipment malfunction, or significant personnel injury, or which could render safeguards ineffective) or trend identified	Extent of Finding, Corrective Action, Root Cause Analysis, Preventive Action, Evaluation for impact on previously delivered material and effectiveness of Corrective/Preventive Actions taken, Presentation to EB leadership, OQE of action (s) taken

Quality Action Plans (QAP)



Supplier Ownership and Commitment

- QAPs are based on actionable data for suppliers to self-assess and develop corrective action plans to address systemic issues
- Items on QAP may be communicated to suppliers and tracked by Supplier Corrective Actions Reports (SCARs)
- Execution of QAPs influences supplier quality scorecard process

Fraud and Falsification

Fraud and Falsification Prevention Program

- Fraud and Falsification Prevention Programs are required by contract
- What is Fraud and Falsification?
  - Fraud and Falsification: an action that deals with intentional deceit, lies, misrepresentation, falsehood, negligence, dereliction, etc. in regards to contract compliance. Key is the fact that fraud and falsification is intentional.
- Elements that often lead to fraud and falsification are:
  - Pressure – motive to commit fraud and falsification
  - Rationalization – justifying behaviors of fraud and falsification
  - Opportunity – the ease at which fraud and falsification can occur

Consequences can be severe, including imprisonment and fines

Fraud and Falsification Program

How is fraud and falsification prevented?

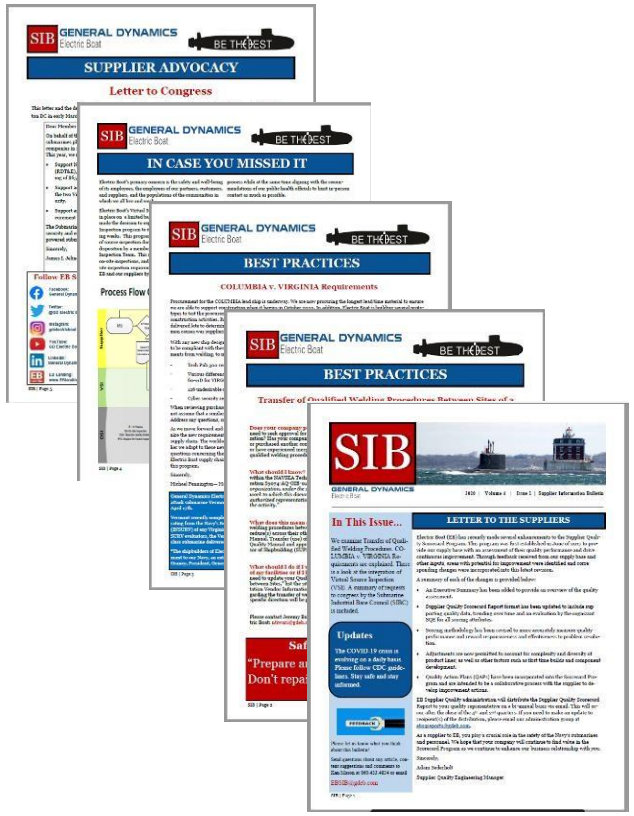
- Be aware and vigilant for Fraud and Falsification (F&F)
- Individual accountability for procedural compliance
  - Know what governs work being performed
  - Ask for assistance if unsure of instructions
  - Always follow documented procedures and processes
- Never falsify records
- Report issues to EB in a timely manner
- Flow down requirements to sub-tier suppliers

Consequences of fraud & falsification could involve functional failure of product in operation on land or at sea, causing loss of equipment and life.

Communications

Supplier Communications from EB

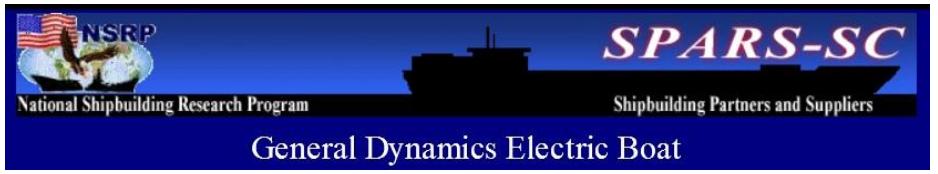
- Electric Boat uses a variety of vehicles to communication expectations, requirements and other information to suppliers
- Communication of Contractual Requirements include but are not limited to:
  - Purchase Order Terms and Conditions
  - Standard Clauses
  - EB Specifications/Drawings
- Communication of Information Guidance include but are not limited to:
  - Letter of Concern
  - Quality Bulletins
    - Targeted quality alerts and lessons learned
  - Electric Boat iSupplier Update Bulletins
    - Important information regarding system changes within iSupplier
  - Supplier Information Bulletin (SIB)
    - Quarterly publication to supply base
    - Pertinent information from Electric Boat
    - Industry quality trends



Communicating with EB

There are various means by which suppliers can communicate with Electric Boat. Some examples are:

- Reporting Non-Conformances
  - Vendor Information Request (VIR)
- Non-Conformance type VIR
  - Use for material not yet delivered
- Letter of Advisement (LOA)
  - LOA are submitted in Oracle iSupplier
  - Use for delivered material
- Submitting documentation for inspection
  - Oracle iSupplier OQE
- Submitting procedures for approval
  - Vendor Procedure Approval Request (VPAR) type VIR



For more information on training, guidance and support using SPARS or Oracle iSupplier please visit our Supplier Website at https://www.gdeb.com/suppliers/5_isupplier_spars/