Quality and Management of the Supply Chain

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15th INPRO Dialogue Forum on Sustainable Supply Chain for Advanced Nuclear Power Systems
Value of quality…

What does quality mean?

What are the goals of the various actors?

Who knows what?

Who does what?

When people misinterpret quality…
Current Supply Chain and Procurement Trends and Challenges 1

- **Nuclear industry situation**
  - What used to be: strong supply chain with steady flow of orders
  - Procurement and supply play a key role in nuclear reliability, sustainability and safety
  - Now this basis is eroding in some countries – e.g. obsolescence, spare part availability problems
  - Re-engineering and justification to use commercial grade items

- **Globalization**
  - Longer supply chains with increased amount of players -> difficult to oversee
  - Supply of piece parts may come even from other continents
  - Strict nuclear quality assurance requirements -> risk of neglecting them to cut costs

- **Localization**
  - Local supply chain is easier to oversight (e.g. manufacturing) and is a priority for Member States
  - However, may also increase risks (ability to supply) especially at the beginning
Current Supply Chain and Procurement Trends and Challenges 2

- **Differing regulatory requirements & standards between the Member States**
  - Comprehensive procurement and supply chain oversight processes not an easy task
  - Vendors and equipment suppliers must face this in every new country
  - Owner / operators need to understand the related risks and apply graded approach (quality assurance approach)

- **Supply of services on-site/off-site is important**
  - TSOs, Testing and inspection as an example of service supply – it is equally important as equipment
  - Management of on-site contractors

- **Technical challenges**
  - New materials & manufacturing technologies
  - Increasing component/module sizes, prefabrication
  - How to detect CFSIs (counterfeit, fraudulent and suspect items)
  - Digitalization, e.g. digital I & C, product information systems, ...

- **Challenges with people**
  - New generation in old/new companies (nuclear knowledge preservation)
  - Old timers faced with new technologies / practices
Safety Standards Related to Procurement and Supply Chain

• IAEA MS standards provide requirements and guidance related to procurement.
  – GSR Part 2 Req’t 11: “Management of the supply chain”.
  – GS-G-3.1 5.50 & 51 “Purchasing”.
  – GS-G-3.5 5.33 to 5.37 “Purchasing”

Remember that supply chain is part of your whole system and it needs planning and repeated oversight
SOME RECENT IAEA ACTIVITIES AND TOOLS IN THE FIELD OF MANAGEMENT SYSTEM AND SUPPLY CHAIN
Recent NES Publication 2016

- Provides good practices for management of procurement and supply chain activities related to the operation and maintenance of nuclear facilities.
- Focused on operational facilities but also provides lessons for new build organizations to avoid issues.

Procurement Guidelines Nuclear Energy Series: NP-T-3.21
Vital procurement competencies*

- Knowledge of management systems, codes and standards;
- Practical negotiation, estimating, and project management skills;
- Technical knowledge;
- “Informed customer” capability;
  - Understanding of need for services and context in which work is performed;
  - Knowledge of what is required and how work will be used;
  - Knowledge of proper specification of objectives, scope and requirements so that the product will meet needs;
  - Knowledge of reasonable time frames for delivery consistent with proper quality;
  - Knowledge and provision of site specific information that could be useful to supplier;
- Understanding of expected work outcomes;
- Ability not to inappropriately influence work outcomes or advice;
- Ability to oversee work in accordance with owner’s procedures and management system and to arrange for technical reviews;
- Ability to ensure regular interaction with suppliers and facilitate interaction with other parties relevant to the task if necessary.

*from NP-T-3.21, adapted from NUPIC
Attributes of Top Suppliers*

- Strong quality culture;
- Management system or quality assurance manual revisions controlled;
- Meticulous order entry review and final certification prior to delivery;
- Strong commercial grade dedication processes;
- Robust internal audits;
- Robust sub-supplier audits and surveys;
- Strong corrective action programmes (based on open risk analysis).

*from NP-T-3.21, adapted from NUPIC

Avoid broken telephone a.k.a. whispering game!
### Procurement challenges / risks

<table>
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<tr>
<th>LEVERAGE</th>
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<td>High expenditure area</td>
<td>Strategic to operations</td>
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<td>Many existing alternate products/services</td>
<td>Few qualified supply sources</td>
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<td>Many qualified supply sources</td>
<td>Large expenditures</td>
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<td>Goods/services readily available</td>
<td>Design to quality critical</td>
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<td>Commercial involvement can significantly impact price</td>
<td>Complex specifications</td>
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<td>Few alternate products available</td>
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<tr>
<td>Low value</td>
<td>Few qualified sources of supply</td>
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<td>Small individual transactions</td>
<td>May have big impact on ongoing operations or maintenance</td>
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<td>“Anyone” could buy it</td>
<td>New technology or untested processes involved in the provision of the product or service</td>
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<td>Unspecified items for everyday use</td>
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The suppliers make similar market analyses
Technical meetings 2017-18

Technical Meeting on Recent Developments in International and National Management System Standards, Including Quality Management Aspects, December 2017

• Conclusion: many comparisons of standards exist, but still in all cases choice of standards has to be based on informed decisions – important to understand the big picture of legislations, regulations and standards, so the IAEA should focus on showing the “standards landscape”

• Website to be launched in 2018

TM on QA/QC Activities in NPPs (with quality management aspects): Lessons Learned and Good Practices, 12-15 November 2018

• Will discuss a publication in preparation with many examples dealing with the supply chain & procurement
Supply chain related guidance is found in many standards according to the phase and type of supply and the regulation

“Interfaces Always Represent Uncertainty”

“You Cannot Inspect Quality into Product or Service”
Quality and Management system aspects of procurement engineering and supply chains

Extrabudgetary Activity 2018-2021 - Planning begun

QA and QC activities including the supply chain

- Web based tools for improved supply chain oversight including “Overview of the international and national regulations & standards in the area of management systems and quality”

Management of service supply

- Includes assuring the competence of NPP contactor personnel

Training course on oversight and management of the supply chain quality with CFSI insights

Other modules will be considered
Add-on: Recent Web tools for better supply chain management

E-learning on procurement for newcomers

Nuclear Contracting Toolkit

- A web-based toolkit to assist in nuclear bidding and contracting processes;

Link [here](#) (procurement) and [here](#) (localization)
Upcoming Guidance

- Developing a draft IAEA Technical Document on inventory control of spare parts and obsolescence management for operating nuclear power plants
- CFSI (Counterfeit, Fraudulent, Suspect Items) NE Series Report (expected in 2018) – NEXT PRESENTATION
Misunderstanding the Quality and Management System function is behind many supply problems

Quality Manuals & Procedures sit on shelves

The actual production of documents is seen as the primary management objective

Quality means complying with the needs/requirements!

Quality is the role of QA Department

Quality has been considered to be all about obtaining signatures
Thank you!
Supply chain and its tiers

- Tier 1: Technology vendor
- Tier 2: Systems integrators
- Tier 3: Original equipment manufacturers
- Tier 4: Subcomponent suppliers/distributors
- Tier 5: Processors/fabricators
- Tier 6: Raw material suppliers/miners

- Nuclear steam supply system
- Reactor vendor
- Reactivity control assembly
- Control components
- Complex alloy
- Silver, zinc, etc.

- Nuclear steam supply system
- Steam generator
- Tube bundles
- Fabricated vessel
- Heat transfer tubes
- Heavy forging
- Thermally treated alloy 690
- Stainless steel
- Iron ore, nickel, etc.
- Iron ore
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**Business impact**

**Supply market challenge**
Procurement Model (from NP-T-3.21)

Specify
- Need identification
- Establishing requirements
- Procurement planning
- Potential procurement scenarios and supplier selection
- Defining acceptance criteria and methods

Source
- Bidding, evaluation and placement of purchase order
- Contract execution, component fabrication and source surveillance
- Packing and transportation
- Expediting
- Acceptance and receipt
- Storage and warehousing

Take corrective action
- Non-conformance control
- Supplier management

Use
- Item installation, testing and use
- Repair, refurbish and return to stock
- Disposing unused material
- Contract closeout

“PDCA”