Importance of nuclear quality in context of nuclear supply chain: codes/norms/standards from IAEA perspective

Workshop on Development of nuclear energy in Poland – local content and global supply chain aspects

10 December 2020

Pekka T. Pyy

IAEA
International Atomic Energy Agency

The IAEA & its Mission

The *International Atomic Energy Agency* (*IAEA*) serves as the world's central intergovernmental *forum* for *scientific* and technical *co-operation in the nuclear field*

Maximizing the contribution of nuclear technology to the world, while verifying its peaceful use

Nuclear energy

Nuclear safety and security

Safeguards

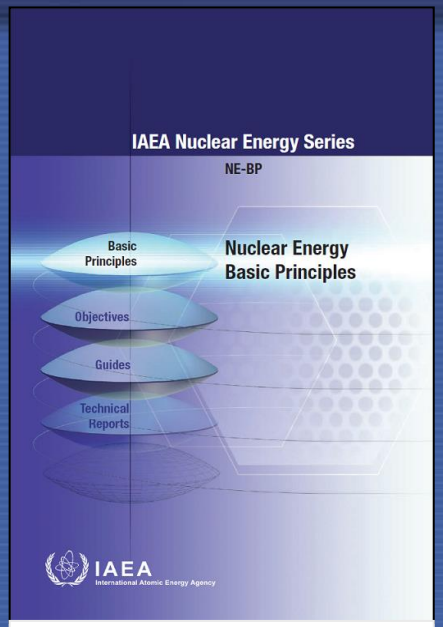
Technical Cooperation

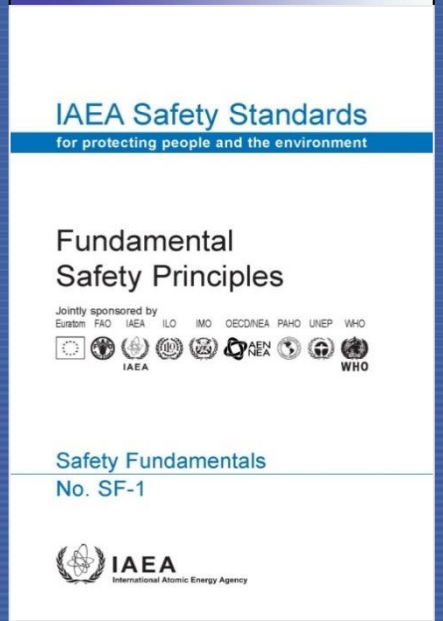
Nuclear sciences and applications

Management

IAEA

Nuclear Energy Basic Principles





Principle 1 — Benefits

Principle 2 — Transparency

Principle 3 — Protection Of People And the Environment

Principle 4 — Security

Principle 5 — Non-proliferation

Principle 6 — Long Term Commitment

Principle 7 — Resource Efficiency

Principle 8 — Continual Improvement

The Basic Principles are intended to provide a holistic understanding to the sustainable planning and use of nuclear energy, and they are in line with SF-1 Safety Fundamentals

Current Supply Chain and Procurement Trends and Challenges 1 (all have to do with quality and cost)

Nuclear industry situation in established nuclear countries

- 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 of the supply chain

- 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 in the new nuclear countries

- Local supply chain is easier to oversee (e.g. manufacturing) and is a priority for Member States
- However, may also increase risks (ability to supply?) especially at the beginning, maintaining the supply chain?

IAEA

Current Supply Chain and Procurement Trends and Challenges 2 (all have to do with quality and cost)

- 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, advanced manufacturing, product information systems, …
- Challenges with people
  - New generation in old/new companies (nuclear knowledge preservation)
  - Oldtimers faced with new technologies / practices

IAEA

What is IAEA doing about this?

- In 2018, the Standing Advisory Group on Nuclear Energy (SAGNE) recommended that the IAEA should "pursue wider international collaboration to manage and improve interfaces between regulators, technical support organizations, owner/operators and suppliers" including "an online platform or portal for information and resource sharing, such as a Nuclear Supply Chain Toolkit".
- Work begun and later US Peaceful Uses Initiative (PUI) funds became available, for which we are grateful to the DOE

TWG-NPP OPS Recommendations in 2019

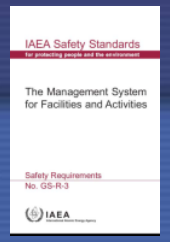
Recommendation ASSC-1: IAEA is recommended to continue to work on general principles for use of commercial grade items taking into account risk-informed approach.

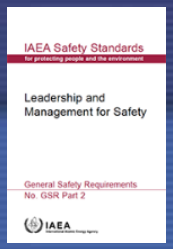
Recommendation ASSC-2: IAEA is recommended to continue developing the nuclear supply chain management toolkit and regulations and standards toolkit based on the comments received from the Member States' industries (maybe a specific meeting).

Recommendation ASSC-3: IAEA is recommended to ensure that the IAEA toolkits make it easier for suppliers to supply and buyers to be able to select.

IAEA

History: Development of IAEA Approach to Management for Quality & Safety





Safety & Performance

Leadership and management (Organizational) level

Leadership and Management for Safety

(Integrated) Management System

GSR Part 2 2015

Quality (Requirement / Detail) level

Quality Management

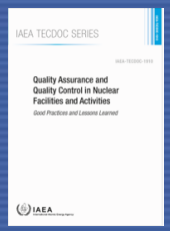
GS-R-3
GS-G-3.1
GS-G-3.5
2006- 2009

Quality Assurance

50-C/SG-Q 1996

Quality Control

50-C-QA 1985-88



Time

WHAT IS QUALITY?

Quality Assurance

- It is about process and providing confidence that requirements will be satisfied
- What are the things that can be done to provide confidence?
  - understand requirements/planning
  - right **people**, knowledge, skills, behaviour
  - right processes, **procedures**, instructions
  - right **equipment**, tools, spares, plant, work environment

IAEA Safety Glossary	The function of a management system that provides confidence that specified requirements will be fulfilled.
ISO 9000:2015	Part of quality management focused on providing confidence that quality requirements will be fulfilled.
ASME NQA-1-2017	All those planned and systematic actions necessary to provide adequate confidence that a structure, system, or component will perform satisfactorily in service.

Quality Control

- It is about products and services / Conformity to requirements
- How QC can be carried out?
  - What things can be done, e.g. measurement, monitoring, surveillance, inspection and test (based on an ITP)?
  - Who should perform QC activities?
    - independence?
- The importance of records

Quality is defined as the "degree to which a set of inherent characteristics of an object fulfils requirements" in the ISO vocabulary

IAEA Safety Glossary	Part of quality management intended to verify that structures, systems and components correspond to predetermined requirements.
ISO 9000:2015	Part of quality management focused on fulfilling quality requirements.

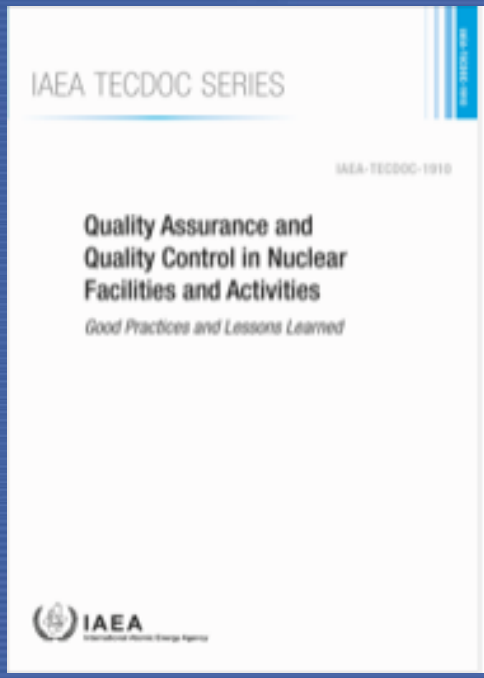
IAEA

TECDOC 1910 (2020)

No valid IAEA NPP related document on quality assurance, quality control and quality management had existed after 2006 (GS-R-3)

- Confusion leading to repeated requests from the Member States
- Explains the concepts of (quality management,) quality assurance and quality control.
- Management systems of nuclear facilities / interfaces with suppliers and subcontractors have to be managed in a detailed manner.
- Discusses the elements of a management system relevant for the quality assurance and quality control functions, such as the generation and retention of documented information.

Downloadable freely at: https://lnkd.in/eR_5Ngt



What is the right level of quality making it possible to construct and operate a NPP sustainably?

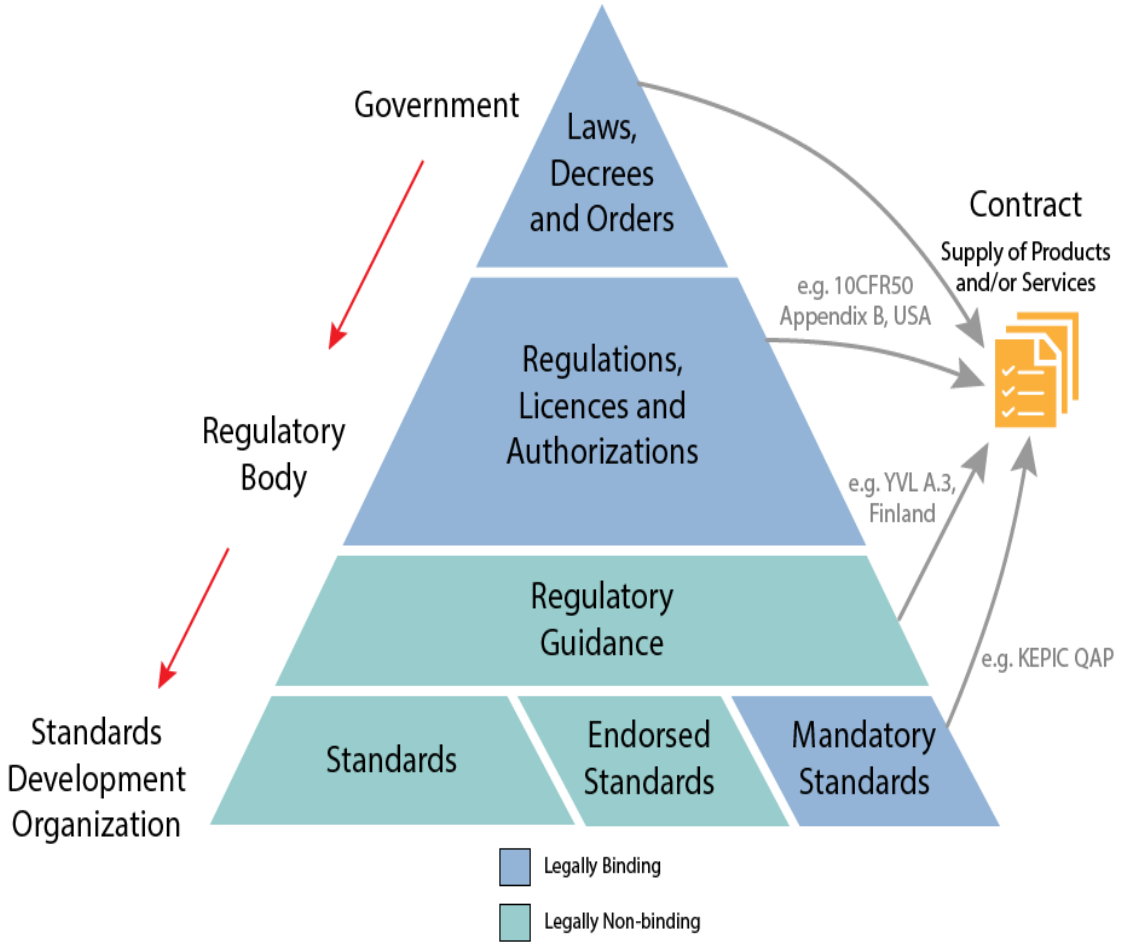
IAEA

Levels of requirements and standards

IAEA

Hierarchy of IAEA Standards

MEMBER STATE



How will this triangle work in case of Poland?

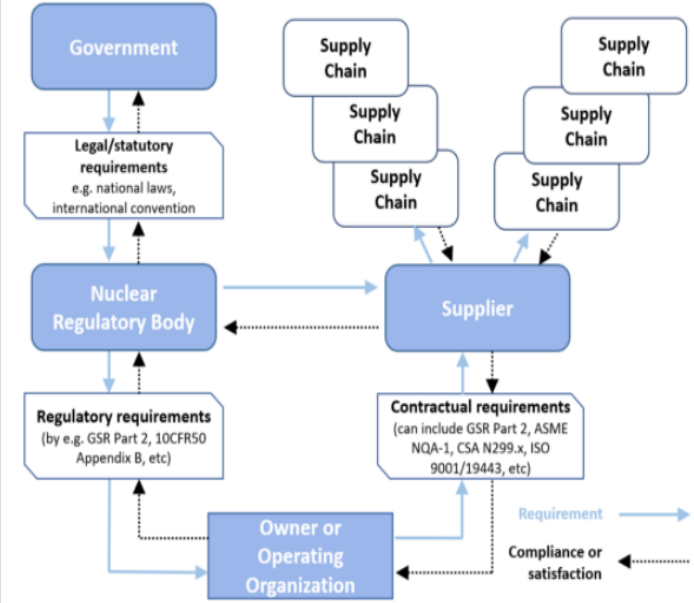
Front page of the current Beta REST toolkit version

References

MSN > The Nuclear Regulations and Standards Toolkit (under construction)

- MSN Calendar
- Evaluation of Management Systems
- The Nuclear Supply Chain Management Toolkit
- **The Nuclear Regulations and Standards Toolkit (under construction)**
  - Introduction, Background and Scope
  - Overview on Legislation, Regulation and Standards
  - National Laws and Regulations
  - Standards
  - Community of Practice
  - References

The Nuclear Regulations and Standards Toolkit



The purpose of this **Web-based profile tool** is to provide a global overview of the way standards, particularly management system and quality standards, can be used to support the achievement of legislative and regulatory compliance and performance improvement. Emphasis is placed on standards that are widely used, particularly International standards. Similarly, different national regulatory requirements are shown to make it easier for users to understand the differences.

The Website presents an overview of the global **regulations** and **standards** landscape so that users can make informed decisions about adapting appropriate standards to complement the IAEA requirements and practical guidance. The Website can also be used by suppliers to be informed about the different practices in different countries so that they may take them into account early on when preparing for their supply processes.

The **Regulations and Standards** Profiles provide good practices and practical examples of lessons learnt from the adoption and use of standards in countries building, operating, replacing and maintaining nuclear power plants and used in facilities and activities. For that purpose, material from the Member States will be an important component.

This information provides a basis for enhanced understanding in dialogue between government bodies, regulators, plant operators and suppliers when dealing with management systems and quality issues. Consequently, it is the intention to update the contents in regular intervals.

It is understood that the information provided herein is not static in time. Legislation, regulations and standards are evolving and undergo review processes which may lead to revisions in their content. Therefore, the content on this website should be seen as living. Users are encouraged to

Filled templates for MS Regulations

- 3.1 Argentina
- 3.2 Armenia
- 3.3 Bangladesh
- 3.4 Belarus
- 3.5 Belgium
- 3.6 Brazil
- 3.7 Bulgaria
- 3.8 Canada
- 3.9 China
- 3.10 Czech Republic
- 3.11 Egypt
- 3.12 Finland
- 3.13 France
- 3.14 Germany
- 3.15 Hungary
- 3.16 India
- 3.17 Iran, Islamic Republic of
- 3.18 Japan
- 3.19 Kazakhstan
- 3.20 Korea, Republic of
- 3.21 Mexico
- 3.22 Netherlands
- 3.23 Pakistan
- 3.24 Romania
- 3.25 Russian Federation
- 3.26 Slovakia
- 3.27 Slovenia
- 3.28 South Africa
- 3.29 Spain
- 3.30 Sweden
- 3.31 Switzerland
- 3.32 Turkey
- 3.33 Ukraine
- 3.34 United Arab Emirates
- 3.36 United Kingdom
- 3.36 USA

Links to webpages:
CNPP
CNS

IAEA

Filled Templates for Standards

- These templates we have filled..

IAEA GSR Part 2, GS-G-3.1, GS-G-3.5
ISO 9001:2015, ISO 19443:2018
ASME NQA-1
ANSI/ANS 3.2
CSA N286-12, CSA N299.x
KTA 1401, KTA 1402
KEPIC QAP

Other standards
ISO 9004:2018
ISO 10005:2018
ISO 10006:2017
ISO 10007:2017
ISO 19011:2018
ISO 14001:2015
ISO 22301:2012
ISO 26000:2010
ISO 30301:2019
ISO 44001:2017
ISO 45001:2018
ISO 55001:2014
ISO/IEC 27001:2013
ISO/TR 10013:2001

IAEA

More to be added …!

New Toolkit for Nuclear Supply Chain Management

Nour Eid, IAEA Department of Nuclear Energy

NOV
19
2020

A new toolkit supports nuclear operators in managing their supply chain. (Image: Lu Han/IAEA)

The IAEA has launched a Nuclear Supply Chain Toolkit to support countries in coordinating among regulators, technical support organizations, owner/operators of nuclear facilities and their suppliers. The toolkit provides examples, case studies and good practices to help ensure that procurement by nuclear power plants, research reactors and fuel cycle facilities is done

Related Stories

Nuclear Power Operators Use Remote Assessments to Overcome Pandemic Mobility Restrictions

Nuclear Operators' Forum Focuses on Sustainable Management of the Nuclear Supply Chain

New IAEA Publication Highlights the Role of Management in Nuclear Power Plant Projects

Related Resources

- Nuclear Supply Chain Toolkit (registration required)
- Management of the nuclear supply chain
- Nuclear Supply Chain Webinar Series
- Management systems for nuclear facilities

Management System Network(MSN) of Excellence

MSN Public | User Profiles | IAEA MS expert recruitment | Discussion Forum | MSN Calendar | Toolkits

> MSN

MSN

- Events
- MSN Calendar
- MSN Newsletters
- CG Acceptance Publication
- 2019 Pilot Course on Nuclear Supply Chain Management and Procurement - Course Materials
- Evaluation of Management Systems
- The Nuclear Supply Chain Toolkit
- The Nuclear Regulations and Standards Toolkit (under construction)
- Recent

Management System Network of Excellence (MSN)

The IAEA developed a dedicated Management System Network of Excellence (MSN) to facilitate and encourage enhanced co-operation and the exchange of knowledge and experience on management systems and safety culture in the nuclear industry and related disciplines throughout the world. The MSN is one of the networks of CONNECT. CONNECT is a web-based platform hosted by the IAEA on behalf of its Member States that will provide a gateway for interconnecting IAEA networks, increasing the participation of individuals and organizations involved in them, and making available additional sources of information that complement existing training workshops and meetings.

Amongst the features provided by CONNECT the MSN will provide the following features related to management systems and safety culture:

- Overview of important meetings
- Discussion forums on both common and special topics
- Expert search function; find the person who can help you with your problems
- Library of documents, presentations, videos, software tools, glossaries, and other resources
- E-Learning: nuclear education and training, on demand video, and archived presentations and seminars
- Resources, including calendar of meetings and events, training courses, webinars, and online meeting workspaces

For further information or questions please contact MSN.Contact-Point@iaea.org

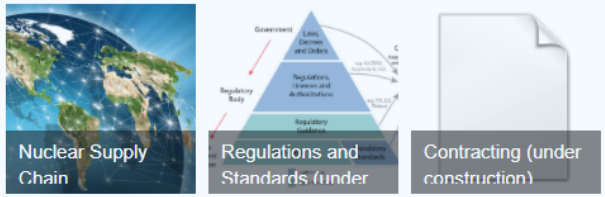
For additional information, please visit:

IAEA NSNI Meetings and Workshops on the Topics of Management, Leadership and Culture for Safety

Human and Organizational Factors

These sites are an information hub where presentations and relevant information from held events in the area is made publicly available to be shared and spread among stakeholders.

Toolkits



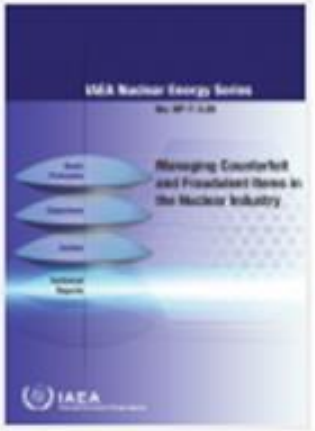
International Atomic Energy Agency (IAEA) Terms of Use Disclaimer

IAEA

Recent publications relevant to nuclear supply chain management and procurement – all freely downloadable

3 June 2020

Quality Assurance and Quality Control in Nuclear Facilities and Activities



19 March 2019

Managing Counterfeit and Fraudulent Items in the Nuclear Industry

12 December 2016

Industrial Involvement to Support a National Nuclear Power Programme

21 September 2016

Procurement Engineering and Supply Chain Guidelines in Support of Operation and Maintenance of Nuclear Facilities

Webinar Series to Cope with Many Topics

Nuclear Supply Chain Introductory Webinars

- Nuclear Supply Chain Management – The Global View (3 December)
- Requirements to the Supplier – Why are they important and where do they come from? (16 December)
- Supply Chain Management Strategy – How to simplify the complex?
- How to Find Good Suppliers – and how to know if they are good for you
- Supervising the Supply Process – What do you need to do?
- Non-Conformances – What are they and how to manage them?
- Delivery Process Final Stages – What do you have to Remember?

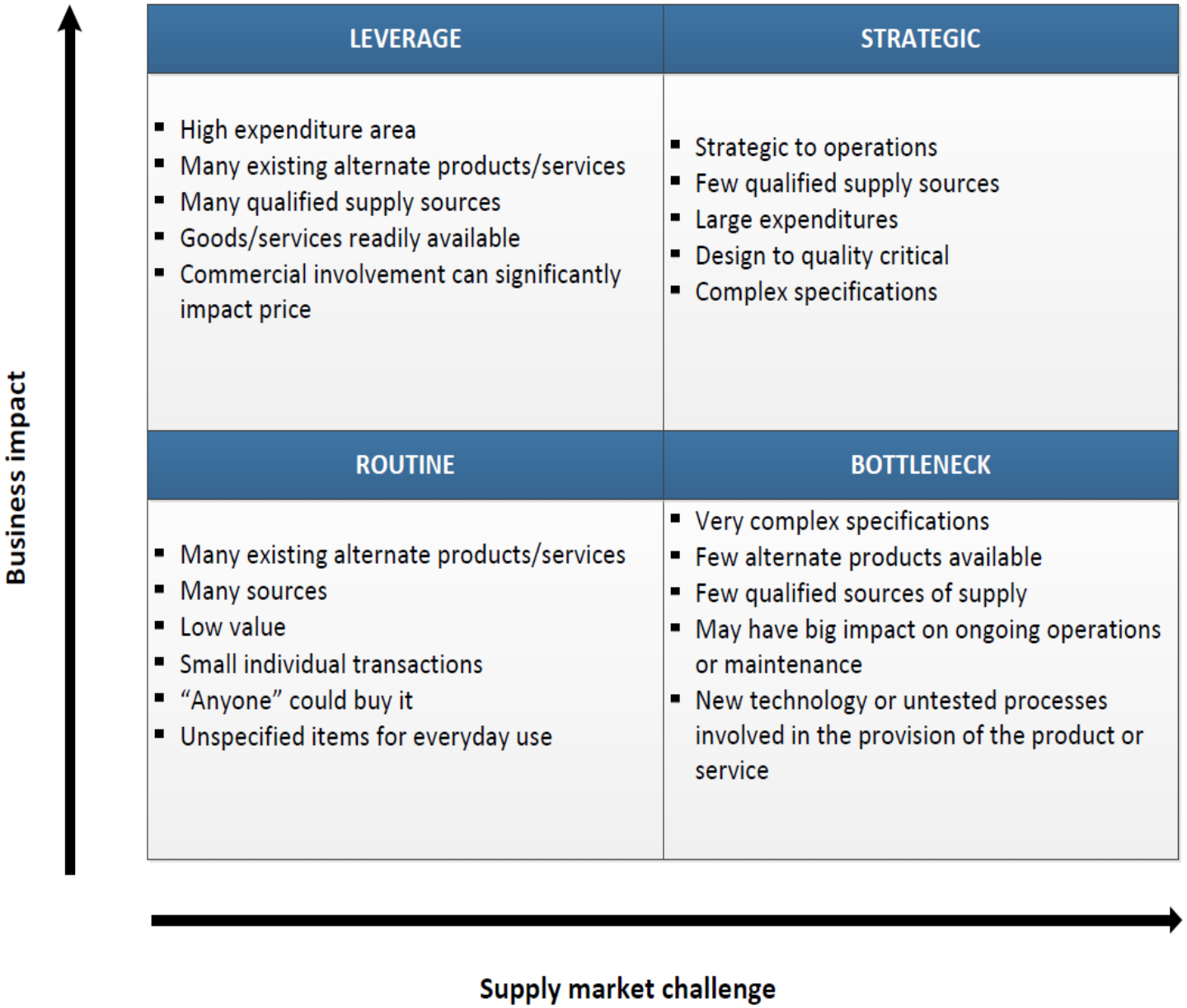
Nuclear Supply Chain Advanced Webinars

- Graded Approach – What are its secrets?
- Supply of service – How is it specific?
- Obsolescence and inventory – Are there good practices?
- Counterfeit, Fraudulent, and Suspect Items – What do you need to know?
- Use of Commercial Grade Items - When and how?
- Innovations (such as Advanced Manufacturing) – Solution or threat?
- COVID-19 and the Nuclear Supply Chain – What did we learn?
- Remote and Hybrid Verification – What have we learned?

IAEA

Finally a word to the Poland - which segment does the Polish Nuclear Supply Chain wish to belong/go?

Strategic commodity positioning (adapted from "Scottish Government, Strategically Positioning the Commodity" with permission).



IAEA

Thank you!

@IAEANE

www.iaea.org/nuclearenergy

IAEA
International Atomic Energy Agency

Mail to:
MSN.Contact-Point@iaea.org