GEN IV International Forum

Expertise | Collaboration | Excellence

Graded Approach: Not just Why and When, but *How*

Mr. A. Vincent Chermak

Idaho National Laboratory, USA

26 August 2021

GEN IV International Forum
Expertise | Collaboration | Excellence

Graded Approach: Not just Why and When, but *How*

Mr. A. Vincent Chermak
Idaho National Laboratory, USA
26 August 2021

INL Idaho National Laboratory

Meet the Presenter

Mr. Vince Chermak is the Assurance Director for the Versatile Test Reactor (VTR) at Idaho National Laboratory. He has enjoyed more than 20 years in Nuclear Quality Assurance that spans the Department of Energy, Naval Nuclear Propulsion Program, United States Commercial Nuclear, ISO, and Nuclear Waste Management industries. He is currently the INL representative to the IAEA for Supply Chain Management Toolkit development initiative. Mr. Chermak is also serving as a member of the ASME NQA-1 Subcommittee on International Activities. He earned a B.S. in Physics and a B.A. Ed. in Mathematics and Physics from The University of Akron.

Mr. Chermak firmly believes that one manages things, and leads people. Leadership is not a position, it is a decision. Each of us has the responsibility to employ everything in our capacity to bring one another together, and walk toward excellence. The most important things we as Leaders can do are recognize and leverage one another's strengths, rather than categorize each other by our differences.

Email: alois.Chermak@inl.gov

What we will discuss today

- Definitions of Graded Approach
- Why do we grade?
- What do we consider when we grade?
- What methods are there to grade our approach?
- Examples

Definitions of Graded Approach

- **NQA-1:2015*:** The process employed, once the applicability of the requirement to the scope of the organization's activity has been determined, to ensure that the levels of analyses, documentation, and actions used to comply with requirements are commensurate with the following:
  a) the relative importance to nuclear safety
  b) the magnitude of any hazard involved
  c) the life-cycle stage of a facility or item
  d) the mission of a facility
  e) the particular characteristics of a facility or item
  f) the relative importance to radiological and nonradiological hazards
  g) any other relevant factors

*Most recent edition identified in NRC RG 1.28 Rev 5.

Definitions of Graded Approach

Definitions of Graded Approach

- **DOE O 414.1D:** the process of ensuring that the level of analysis, documentation, and actions used to comply with requirements are commensurate with:
  (1) relative importance to safety, safeguards, and security;
  (2) the magnitude of any hazard involved;
  (3) the life-cycle stage of a facility or item;
  (4) the programmatic mission of a facility;
  (5) the particular characteristics of a facility or item;
  (6) the relative importance of radiological and nonradiological hazards; and
  (7) any other relevant factors. (10 CFR 830)
- **Also found in NQA-1:2019; Part 2 Subpart 2.23**

Definitions of Graded Approach

- **IAEA WS-G.5.2 "Safety Guide on Safety assessment for decommissioning":** A graded approach is a process by which the level of analysis, the documentation and the actions necessary to comply with the safety requirements and criteria are commensurate with:
  - (a) the magnitude of any hazard involved
  - (b) the particular characteristics of a facility
  - (c) the step within the decommissioning process
  - (d) the balance between radiological and non-radiological hazards

Definitions of Graded Approach

IAEA Use of a Graded Approach in the Application of the Management System Requirements for Facilities and Activities; ANNEX X:

> For a system of control, such as a regulatory system or a safety system, a process or method in which the stringency of the control measures and conditions to be applied is commensurate, to the extent practicable, with the likelihood and possible consequences of, and the level of risk associated with, a loss of control.

- For a system of control, such as a regulatory system or a safety system, a process or method in which the:
  - (a) stringency of the control measures and conditions to be applied
  - (b) is commensurate to the extent practicable,
  - (c) with the likelihood and possible consequences of, and
  - (d) the level of risk associated with
  - (e) a loss of control.

Definitions of Graded Approach

- **Big Picture:** what do they have in common?

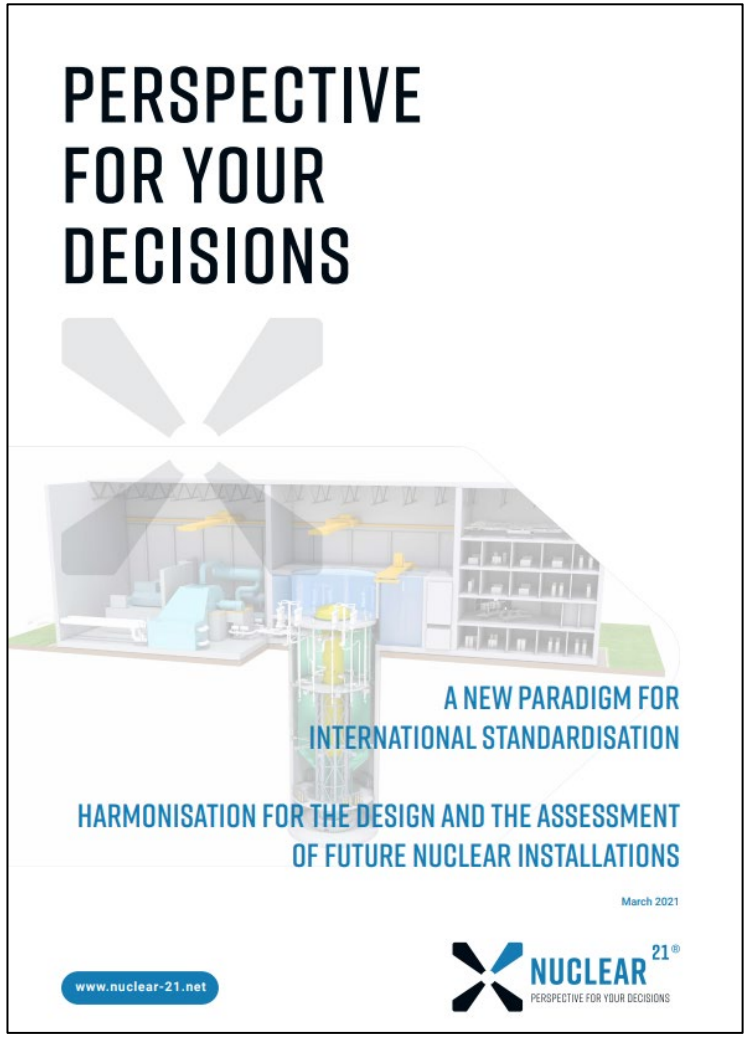
Definitions of Graded Approach

- **Big Picture:** what do they have in common?
  - Application
  - Characteristics
  - Significance
  - Probability of Failure
  - Consequence

Definitions of Graded Approach

- **Big Picture:** what do they have in common?
  - Application
  - Characteristics
  - Significance
  - Probability of Failure
  - Consequence

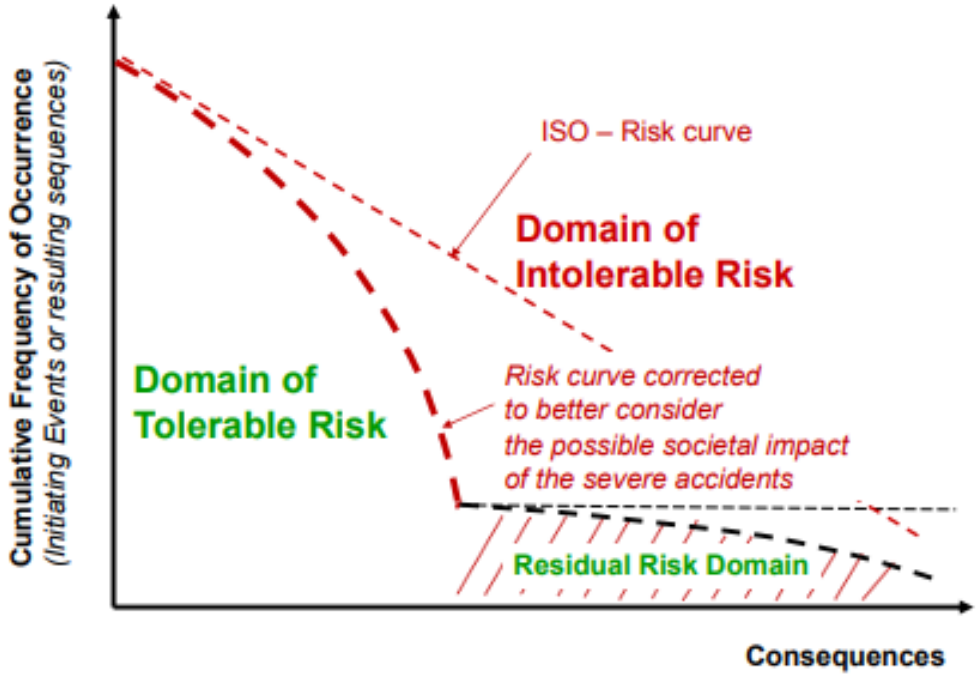
Gian-Luigi Fiorini
Luc Van Den Durpel



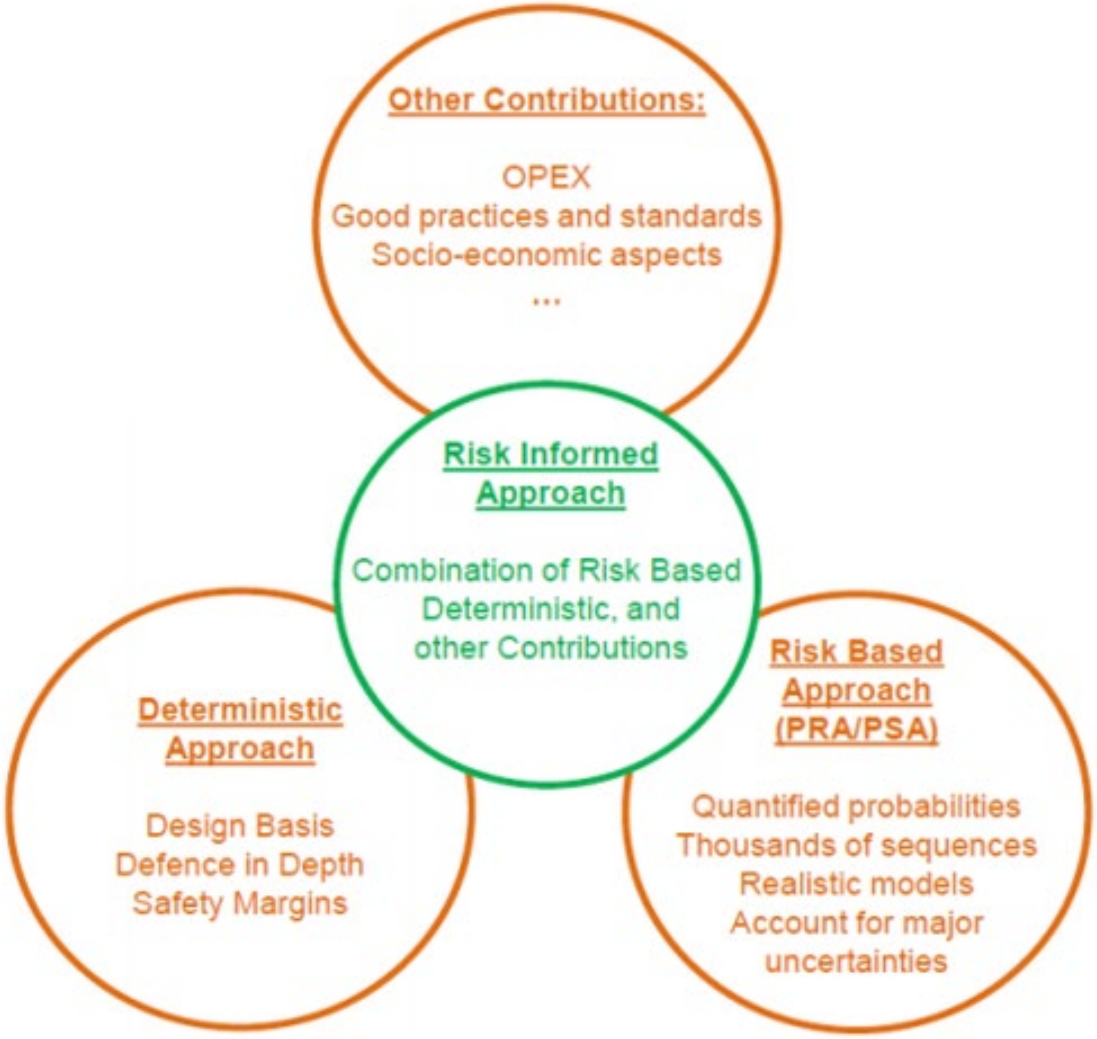
https://nuclear-21.net/viewpoints/perspectives-a-new-paradigm-for-international-standardisation-harmonisation-for-the-design-and-the-assessment-of-future-nuclear-installations/

Risk Informed Approach

Schematic representation of the Risk domain (the so-called Farmer Curve and the needed evolution)



The principles of the Farmer curve



Components of the Risk Informed Approach

Nuclear-21, Perspectives Report on "A New Paradigm for International Standardisation: Harmonisation for the Design and the Assessment of Future Nuclear Installations," March 2021

Why do we grade our approach to Quality?

Why do we grade our approach to Quality?

- **Goal:**
  - Balance the application of process controls
  - With business needs
  - To provide an efficient and
  - Compliant work process.

Consequences of improper grading:

- **Imposing excessive requirements**
  - Don’t add value
    - Unnecessary
    - Not appropriate
  - Overspecification can reduce the opportunity for success
  - Additional avoidable time and costs
- **Not imposing applicable requirements**
  - Can result in discrepant conditions
  - Can increase the hazard associated with the work
  - Will generally cost more
    - internal rework (the cost of poor performance)
    - returns (the cost of poor quality)

What do we consider when we grade?

What do we consider when we grade?

- **Revisit the Big Picture:** what do the various approaches have in common?

GEN IV International Forum
Expertise | Collaboration | Excellence

What do we consider when we grade?

- **Revisit the Big Picture:** what do the various approaches have in common?

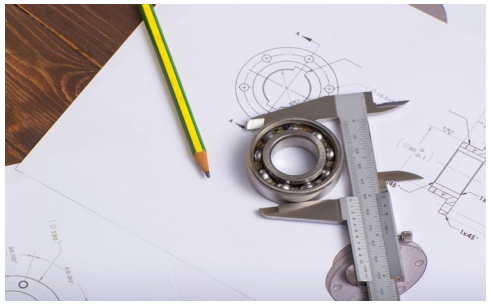
What do we consider when we grade?

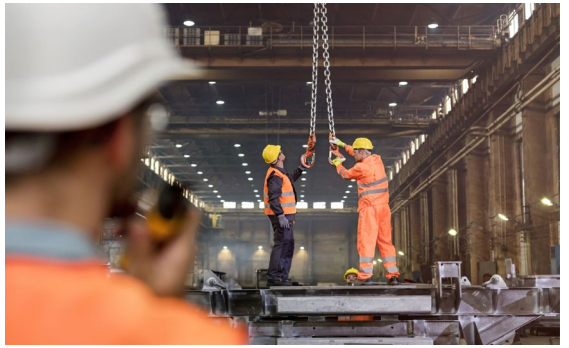
- **Big Picture:** what do the various approaches have in common?
  - Application
  - Characteristics
  - Significance
  - Probability of Failure
  - Consequence

What Methods are there to grade our approach?

What Methods are there to Grade our Approach?

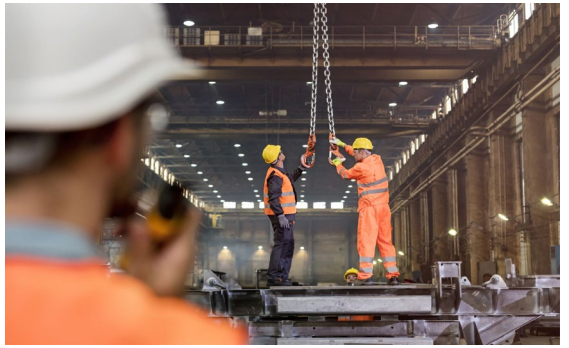
- **There are two ways to grade our approach:**





What Methods are there to Grade our Approach?

- **There are two ways to grade our approach:**
  - **Change the level of rigor for regulated activities**



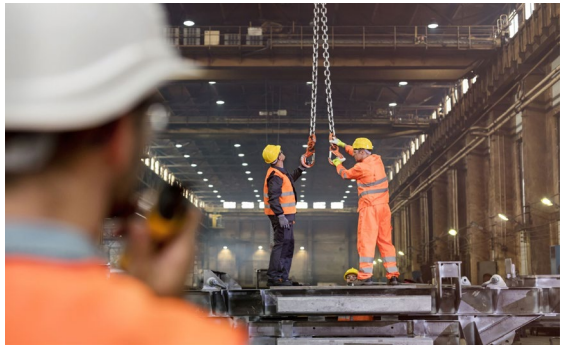
What Methods are there to Grade our Approach?

- There are two ways to grade our approach:
  - Change the level of rigor for regulated activities



  - Change the level of rigor for regulated personnel





Quiz!

- Is adding a peer check in a welding process considered grading your approach?

Quiz!

- Is adding a peer check in a welding process considered grading your approach?
  - Peer check is not a regulated activity
  - “Peers” are not regulated personnel

What examples of graded approach can we share?

Examples:

- Eliminating an inspection and replacing it with a peer check.
  - Eliminated the need for fully qualified QCIs
  - Decreased wait time
  - Decreased COPP

Examples:

- Eliminating an inspection and replacing it with a peer check.
  - Eliminated the need for fully qualified QCIs
  - Decreased wait time
  - Decreased COPP

- Certifying receiving personnel as receipt inspectors.
  - Decreased the level of rigor for certification
  - Decreased wait time

Examples:

- Eliminating an inspection and replacing it with a peer check.
  - Eliminated the need for fully qualified QCIs
  - Decreased wait time
  - Decreased COPP

- Certifying receiving personnel as receipt inspectors.
  - Decreased the level of rigor for certification
  - Decreased wait time

- Eliminating QA signature from particular design documents
  - Moved to final design package for those documents

Examples:

- Eliminating an inspection and replacing it with a peer check.
  - Eliminated the need for fully qualified QCIs
  - Decreased wait time
  - Decreased COPP

- Certifying receiving personnel as receipt inspectors.
  - Decreased the level of rigor for certification
  - Decreased wait time

- Eliminating QA signature from particular design documents
  - Moved to final design package for those documents

References

- ANSI/ASME NQA-1–2015: Quality Assurance Requirements for Nuclear Facility Applications, February 20, 2015
- 10 CFR 830, Nuclear Safety Management
- U.S. Department of Energy Order (DOE) Order 414.1D: Quality Assurance
- ANSI/ASME NQA-1–2019: Quality Assurance Requirements for Nuclear Facility Applications, December 31, 2019
- IAEA Safety Standards Series No. WS-G-5.2: Safety Assessment for the Decommissioning of Facilities Using Radioactive Material, 2008
- IAEA-TECDOC-1740: Use of a Graded Approach in the Application of the Management System Requirements for Facilities and Activities, 2014
- A New Paradigm for International Standarisation: Harmonisation for the Design and the Assessment of Future Nuclear Installations, Nuclear-21, March 2021 https://nuclear-21.net/viewpoints/perspectives-a-new-paradigm-for-international-standardisation-harmonisation-for-the-design-and-the-assessment-of-future-nuclear-installations/
- IAEA Safety Standards Series No. SSG-22: Use of a Graded Approach in the Application of the Safety Requirements for Research Reactors

Questions

Please input questions into the chat while our host discusses upcoming Gen IV International Forum webinars.

Upcoming Webinars

Date	Title	Presenter
23 September 2021	Experimental R&D in Russia to justify Sodium Fast Reactors	Dr. Iuliia Kuzina, IPPE, Russia
28 October 2021	Metal Fuel for Prototype Generation-IV SFR: Design, Fabrication and Qualification	Dr. Chan Bock Lee, KAERI, Republic of Korea
18 November 2021	Geometry Design and Transient Simulation of a Heat Pipe Micro Reactor	Dr. Jun Wang, University Of Wisconsin, Madison, USA