



Office for
Nuclear Regulation

Development of the regulation of AI for nuclear applications in UK

Generation IV International forum
TS02 - Artificial Intelligence for Nuclear

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ONR's approach to innovation

“Innovation is the implementation of new ideas that generate value”

ONR's Strategy 2020-25

Innovation Hub - Internal



Embrace innovation, new approaches and technologies in how and what we regulate, sharing best practice case studies and encouraging dialogue

- Horizon scanning
- Knowledge management
- Inspector development
- Communications

Approach to regulating innovation 2020.

Innovation Hub - External

Supporting the adoption of innovative solutions by the nuclear industry and its supply chain where it is in the interest of society and is consistent with safety and security expectations

- Expert panels
- Advice
- Regulatory sandbox



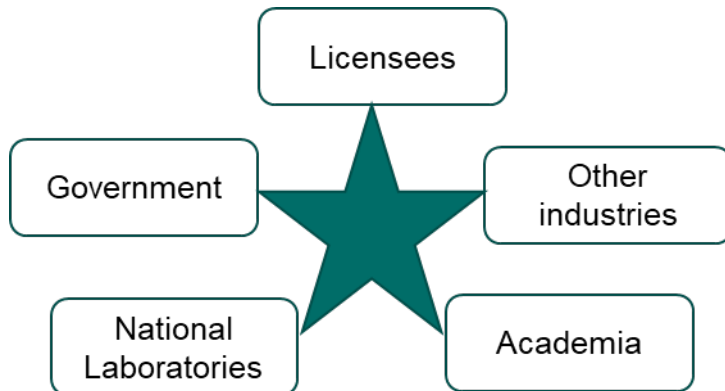
Developing an approach to the regulation of Artificial Intelligence

- Research – “Impact of AI / ML on nuclear regulation”
- Expert panels on the regulation of AI
Joint initiative with the Advanced Nuclear Skills and Innovation Campus (ANSIC).

Aim - to establish a roadmap for effective and enabling regulation of AI in the nuclear sector.



Collaboration



Outcome so far...

- Opportunities and challenges in the application of AI (likely to be the same across other industrial sectors)
- Element of a regulatory framework
- 2 x examples to go into regulatory sandbox

AI – Key regulatory themes

Three broad opportunities for the deployment of AI;

- Advisory
- Supervisory
- Control



- **Development of AI systems**
Good systems for development, config. control, training data, cyber
- **Understand performance characteristics of the AI systems**
How to understand performance and transfer info from other sectors
- **Confidence in performance of AI systems**
Challenges with testing. Phased to build confidence / experience
- **Dealing with failure**
Define / recognise failure. Use existing models (e.g. defence in depth)
- **Develop skills and experience including understanding the complexities of behaviours between humans and AI.**

AI Sandboxing examples

Use AI to derive information from plant to inform structural integrity claims in a safety case to help demonstrate reliability. It is thought that this will assist in the development of digital twins and probabilistic assessment to demonstrate asset in-service operational life.

Use AI for real-time application to inform operations and understanding stresses and potential environmental constraints to, for example, optimise robotic movements.

What's next...

- We are trialling an approach to the regulation of innovation
- One of the trials is on the regulation of AI when applied in a nuclear setting.
- The next stage is to put two examples of the application of AI into our new regulatory sandbox.
- Thank you!!!

References

- Impact of AI / ML on nuclear regulation
- <https://www.onr.org.uk/documents/2021/onr-rrr-121.pdf>
- ONR's approach to regulation
- <https://www.onr.org.uk/regulating-innovation.htm>
- Outcome of the expert panels on the regulation of AI
- <https://www.onr.org.uk/regulating-innovation.htm>