Office for Nuclear Regulation

Preparing for Regulating Advanced Nuclear Technologies

GIF Symposium, Paris, 16-17 October 2018

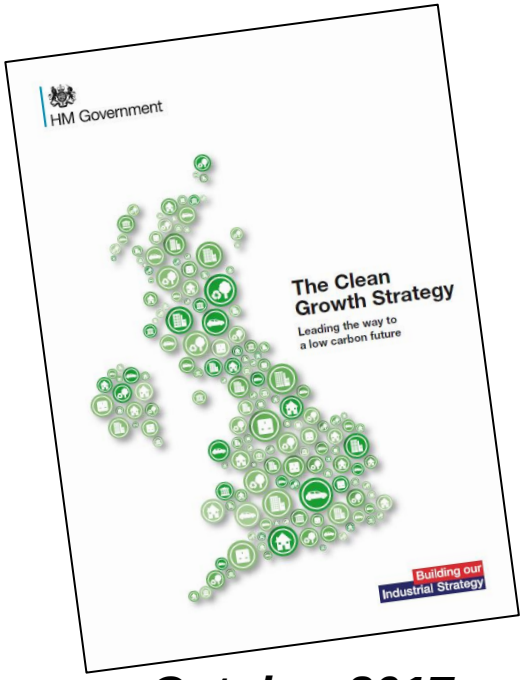
Dr Diego Lisbona

New Reactors Division

Office for Nuclear Regulation, United Kingdom

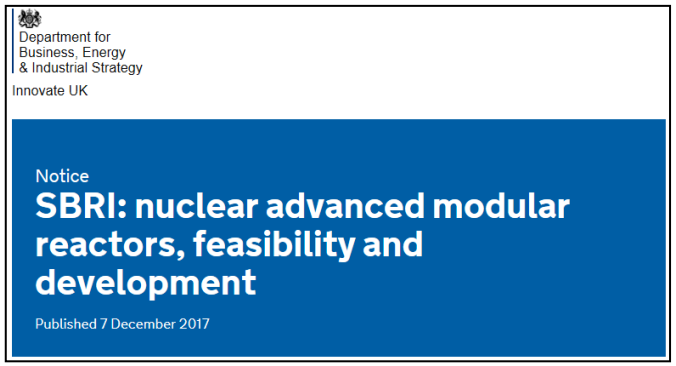
Office for Nuclear Regulation

Background to our work on ANTs

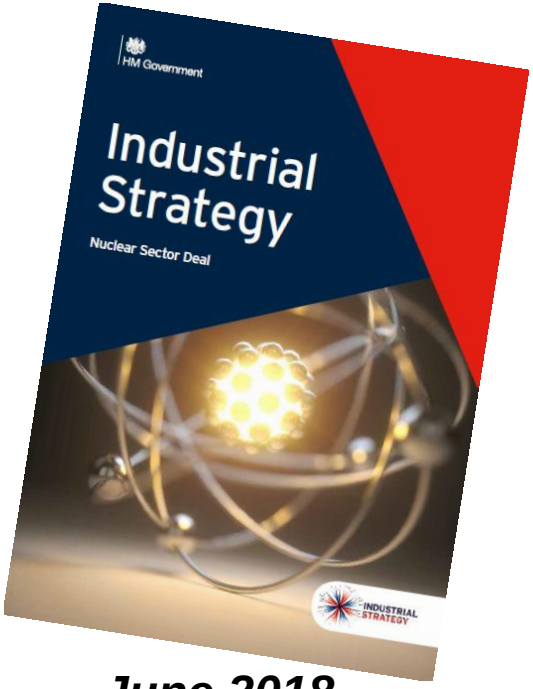


October 2017

ONR's Programme to Grow ONR's Capability in ANT (sponsored by BEIS)



December 2017



June 2018

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ONR's regulatory philosophy

- **Goal setting – (mostly) non-prescriptive**
- Targets developing and sustaining an open and effective dialogue with dutyholders → positive and **enabling** approach overall
- Overarching requirements of our regulatory work are ensuring that risks are reduced As Low As Reasonably Practicable **(ALARP)**
- Use of **Relevant Good Practice (RGP)** is at the core of the demonstration of ALARP

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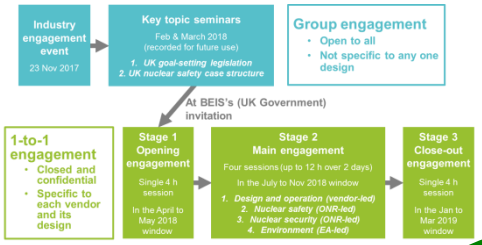
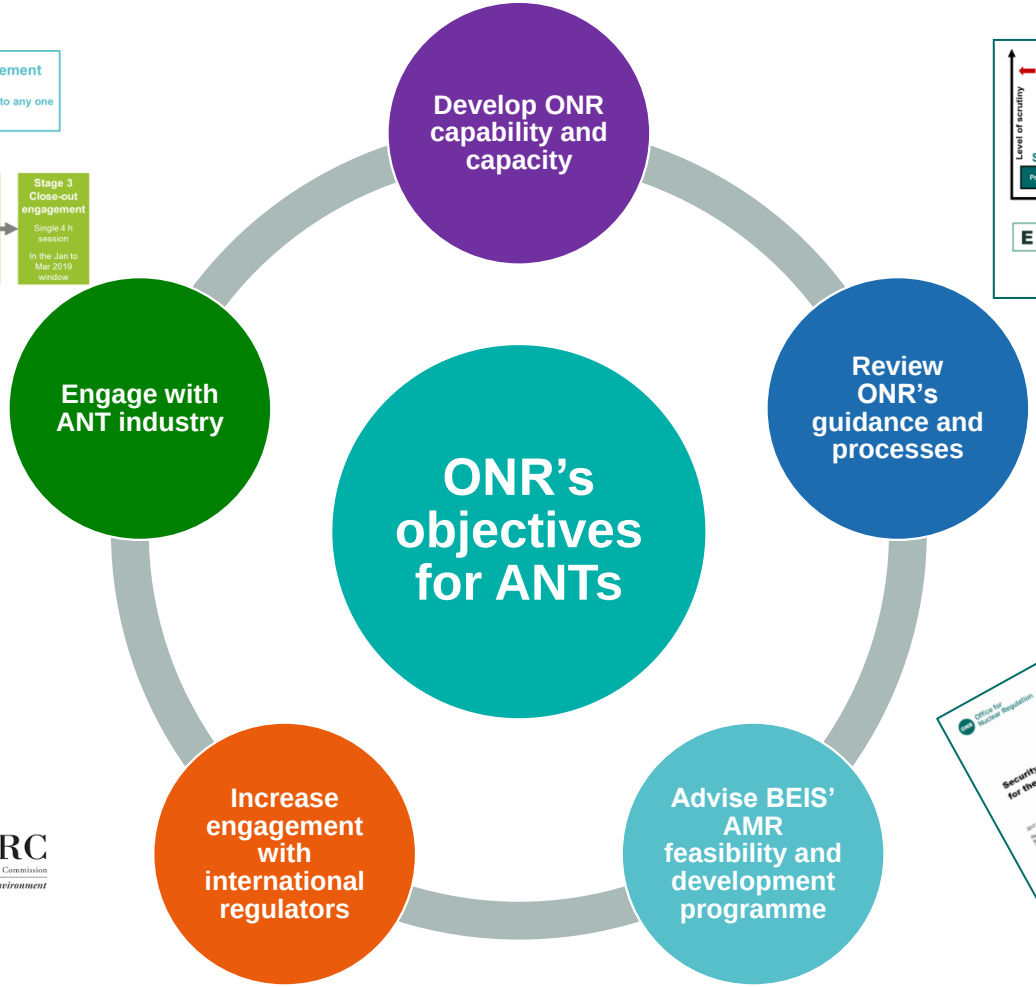
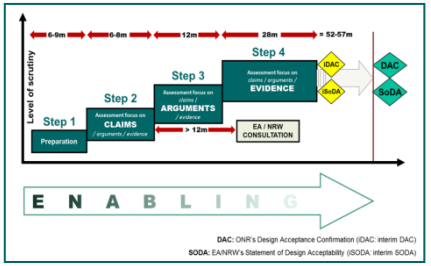
Objectives of our work on ANTs







IAEA

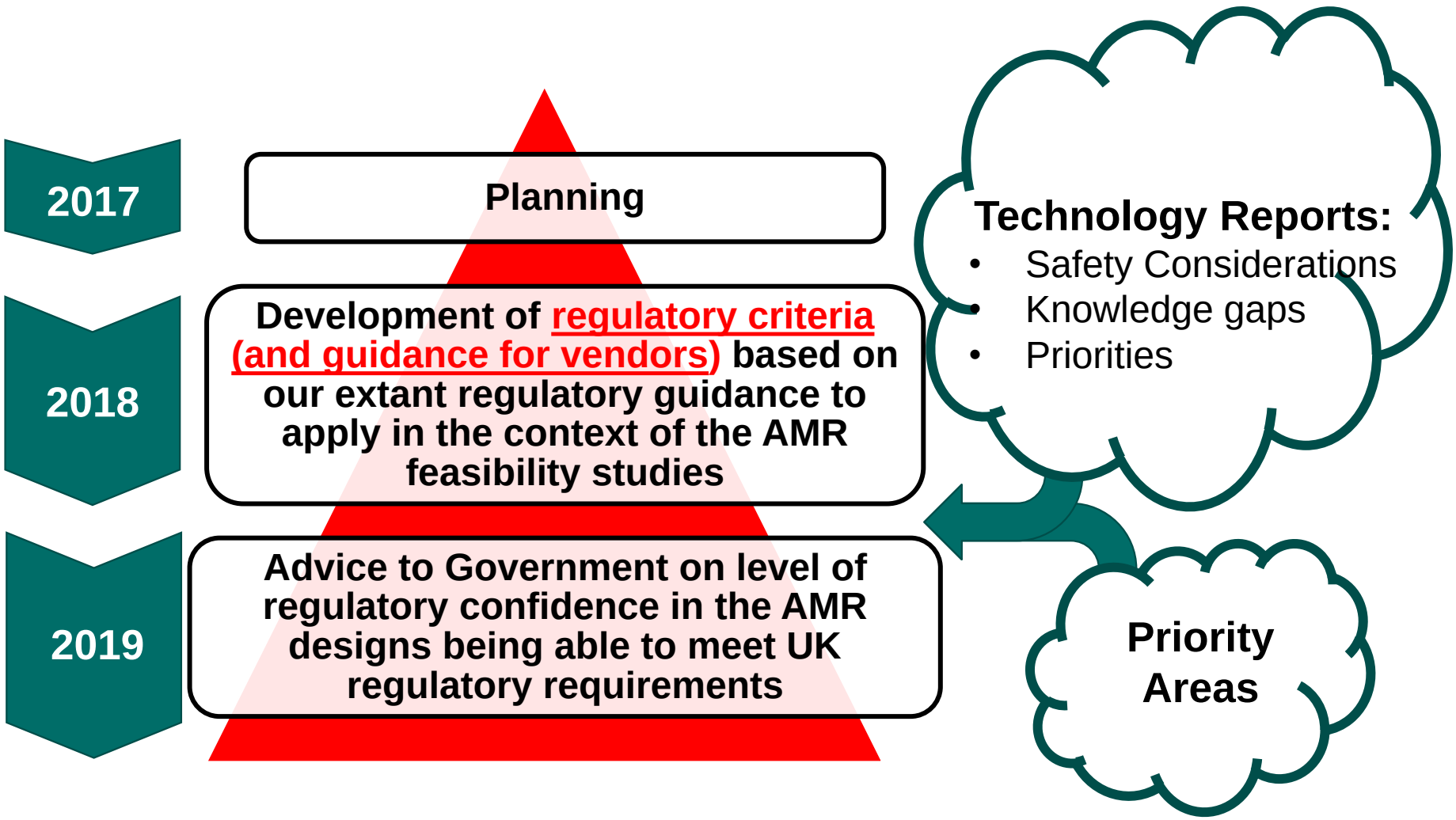
SMR REGULATORS' FORUM

NEA
NUCLEAR ENERGY AGENCY

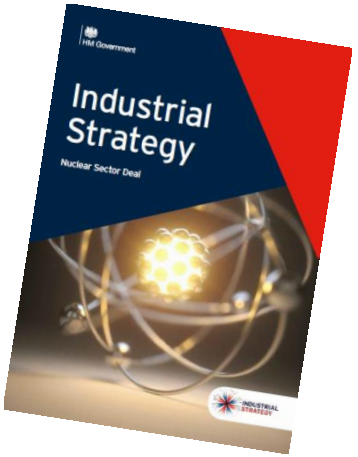
CNSC CCSN

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Advice to BEIS



AMR F&D study



- **Developing and deploying advanced nuclear technologies… 7 fission designs**
- **1 SFRs, 2 LFRs, 3 HTGRs, 1 MSR:**
  - Advanced Reactor Concepts LLC
  - Westinghouse Electric Company UK Limited
  - LeadCold
  - U-Battery Developments Ltd
  - Ultra Safe Nuclear Corporation
  - DBD Ltd
  - Moltex Energy Limited;
  - Tokamak Energy Ltd;

Not to be confused with any of the steps of a **Generic Design Assessment (GDA)**

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Capability building

Training need family	Training profile				
	ANT PROJECT RESILIENCE / INCREASING NEED LONG TERM				
	AMR feasibility study core team	Internal Stakeholders (peer reviewers /PLs)	AMR team	ANT team	New Reactors Division & ONR
Familiarisation with all 4 design types	Gen IV Training Courses	TSC courses			Staff Briefings
		AMR Knowledge Management Workshops			
Targeted learning	Discipline-specific / Reactor Type-specific Training Courses Conferences / Research				
Regulatory benchmarking and International Engagement	IAEA SSR 2/1, SMR Regulators Forum Nuclear Energy Agency (NEA) WGSAR CNSC US NRC				

INCREASING NEED LONG TERM

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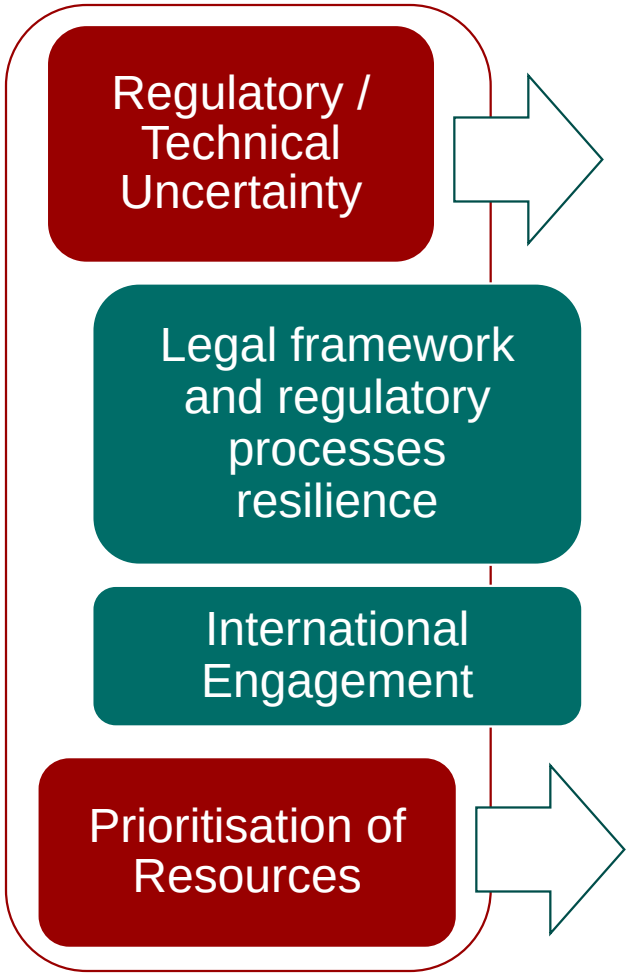
Challenges and Opportunities



- We have developed a **process** to identify **key safety considerations**, **knowledge gaps** and **priorities** for future regulatory work and training related to ANTs
- We are undertaking a **focused review** of our **guidance** (SAPs, SyAPs & TAGs) to ensure that it is **fit for purpose** for the regulation of ANTs
- The Generic Design Assessment (GDA) process is being modernised taking account of **learning from previous assessments** and by introducing **greater flexibility** into the process which is important for ANTs

- In order to support UK Government's **AMR research initiative**, we have developed **regulatory criteria** based on our existing regulatory guidance to apply it in the context of the AMR feasibility studies
- We have developed a **process** that enables us **to engage with the ANT industry**. We are implementing this process via seminars and 1-to-1 workshops over 3 stages
- We actively participate in **ANT international fora**

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Thank You

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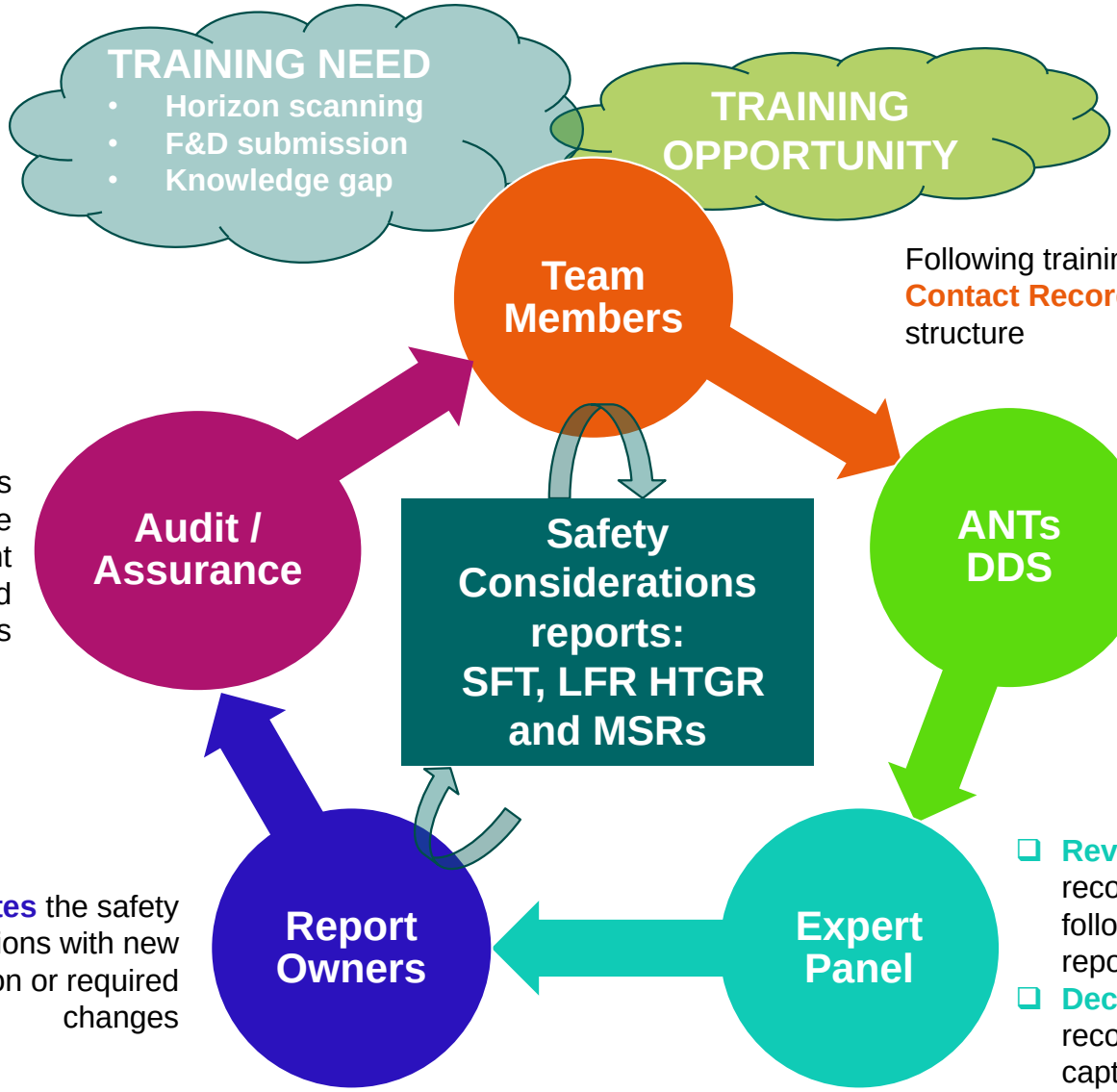
Capability building



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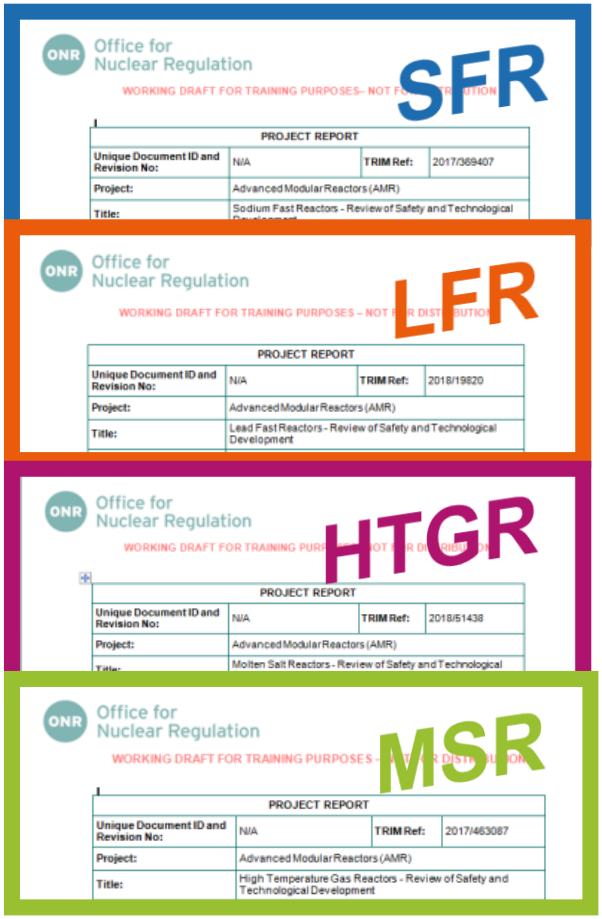
AMR Safety Consideration Reports



- Informing our current <u>focus</u> on:
  - **Material compatibility** and structural integrity challenges
  - **Fuel** incl. TRISO fuel and novel materials
  - **Molten Salt** reactor **chemistry**
  - **Operational experience** including linkage with other Government initiatives

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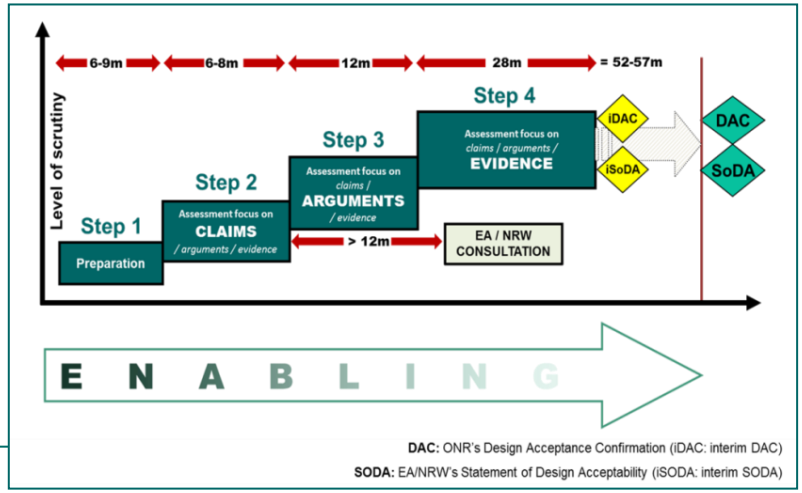
Improvements to the Generic Design Assessment (GDA)

- GDA was originally developed for large & well established / mature reactor designs but, with SMRs, the regulatory landscape is changing
- As part of continuous improvement, ONR and EA have looked at whether there are elements of the GDA that could be improved to:
  - Add flexibility and better adapt to the differing levels of maturity and development of SMR vendors and their technologies
  - Capture important lessons learnt from previous and ongoing GDAs
  - While remaining consistent with previous GDAs
- Reviews and approvals of the modernisation proposals complete
- We are currently progressing implementation of the proposals (update of guidance to GDA Requesting Parties and drafting new technical topic specific guidance)



Review of Guidance

- Safety Analysis (ongoing)
- Engineering (ongoing)
- Licensing and Supply Chain (planned for 2019)
- Security (planned for 2019)
- Emergency Planning, Transport, Site Characterisation (under consideration)