**Integration Group for the Safety Case (IGSC) Symposium 2024***MOVING TOWARDS THE CONSTRUCTION OF A SAFE DGR – GETTING REAL*

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| **Abstract Title:**  GeneSiS and EGSSC: Developing a Safety Case Ontology | |
| **Abstract (300-500 words):**  Developing a deep geological repository (DGR) and demonstrating it will be safe is a cross-disciplinary and multi-generational challenge. A DGR is a complex system: multiple sub-systems, both natural and engineered, have to work together to provide safety over very long timescales, while evolving in response to internal and external factors. Safety cases for DGRs need to draw on a large body of interrelated information, which will grow as the programme progresses. They need to maintain consistency across different documents, disciplines, and work areas (for example: between claims made in the safety case; underpinning evidence developed through research, waste and site characterisation; and resulting requirements on the design), and they need to continue to do so as understanding grows, the design and associated safety case evolve, and the staff involved change. This change management is a challenging problem which improved information management and associated digital systems can help address.  Decades of research have led to the development of internationally recognised safety case methods to enable the unique challenges associated with geological disposal to be addressed. Although the details of the implementation differ between safety cases, many of the fundamental elements of a post-closure safety case (for example, FEPs, safety functions, engineered and natural barriers, models, assessments, and data) and the relationships between them are fairly well established and documented in publications such as MeSA (the NEA’s Methods for Safety Assessment of Geological Disposal Facilities for Radioactive Waste), while other areas (for example, requirements and claims and their relationships to other safety case elements) are still being developed through projects like MeSA 2 (see related abstract, “Repository construction and safety assessment – towards a holistic approach”).  This project represents a collaboration between EGSSC (the NEA Expert Group on Data and Information Management Strategy for the Safety Case) and GeneSiS (the NEA ad-hoc group for Generic to Site Specific Safety Cases). It builds on work in MeSA and MeSA 2, and the experience of participating countries, and makes use of established methods from the semantic web and model-based systems engineering to develop a ‘safety case ontology’: an explicit formal structured representation of the different elements relevant to a safety case and how they interact with each other, and an accompanying set of definitions. This will be presented in a concise visual format which is easy to understand and communicate.  A safety case ontology can provide a robust and durable basis which different countries exploring deep geological disposal can use to improve their understanding and develop their digital framework. This is associated with benefits in consistency, change control, knowledge management, search, and useability. By presenting it in a concise visual format, it can also be used as a communication tool and training resource for people from diverse disciplines to quickly familiarise themselves with safety case methods and their wider context. Derivation of an ontology through international collaboration also encourages thinking in advance about all the elements that relate to a safety case in a holistic way and expressing this clearly, fostering common understanding and exchange of experience. | |