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ACTIVITIES (D5)

Emerging trends of knowledge management in organizations (2)

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PYTHIA - AN LLM-DRIVEN AUTOMATED PLATFORM THAT USES ESTABLISHED  
CONSENSUS-BUILDING TECHNIQUES TO CAPTURE AND SYNTHESISE THE WISDOM OF A  
PANEL OF RENOWNED AUTHORITIES ON SPACE ENGINEERING.

**Abstract**

All space missions share common features such as a list of requirements, known risks (and associated mitigation strategies), and an agreed understanding between the stakeholders on the level of product assurance to be applied. The relationship between product assurance effort, mission risk and total mission costs are well understood (cf. Wertz et al, 2011). International Space Engineering Standards such as NASA's NPR series, NASA centre guides, and ECSS exist to codify known best practices, (cf. NPR 7123 ,NASA, 2023; ECSS-S-ST-00C, ECSS Secretariat, 2020) which may or may not be complied to, depending on the risk, schedule and budget appetite of mission stakeholders (c.f Bordi, Scolese, IAC-18-D1.5.2).

What is less well understood is the nuanced understanding of the different ways standards can be interpreted, and applied to mission development processes(cf. Gericke Moser, 2012). This understanding is currently built organically through the experience of engineers as they progress in their careers (cf. McKenna et al., 2016).

We propose an automated, intelligent system "Pythia" that can capture the knowledge, experience and opinions of senior space engineers with widely diverse experiences and perspectives, and synthesise them using established consensus building methodology (Delphi Method; Hasson et al., 2000) into a formally-defined knowledge graph database. This database can then be queried, analysed and deployed for a myriad of applications.

We will present the results of a proof of concept demonstration, capturing the experience of high profile experienced engineers with world-class reputations in diverse space domains such as "New Space", CubeSats, and "By the book" ESA and Geostationary missions, and show how the information is combined and recorded by Pythia, and applied by a second AI system 'Virgil'.