Organisational Design: The systematic derivation and evaluation of extended enterprise processes from system architectures

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The architectures of extended enterprise systems, including the supply networks that design, develop and support large, complex, engineered products, often reflect system-level design decisions made early in the product development process. Design tools used at this stage focus on the physics and optimisation of system behaviours. Comparable tools for the consideration of extended enterprise perspectives are not available despite the costs of non-quality often attributed to supply chain issues[1].

This poster introduces an interface to a simulation package (WITNESS) that derives supply chain processes from system architectures, so enabling the visualisation of supply chain risk profiles in early design decisions. The interface uses input data (a system architecture and associated make-buy scenario) which are available early in the design process. Supplier data needed to drive the simulations is predefined and editable by users.

This poster introduces results from the development of a proof-of-concept software prototype[2] that demonstrates the feasibility of generating enterprise architectures from parts lists and coupling these with a systems design vee model[3] to create executable simulation models. Future developments will consider how suppliers are characterised and improving understanding of the needs and requirements of early stage design[4].

[297/300 (max) words]

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[1] For example, the UK's Crossrail project lessons learnt include recommendations for the management of quality in supply chains: https://learninglegacy.crossrail.co.uk/documents/supply-chain-quality-requirements/

[2] An interactive demonstration of the proof of concept software will be available on request.

[3] McKay, A., Baker, R., Chittenden, R., de Pennington, A. (2018) A framework for students to visualize the implications of design decisions in global supply networks. Engineering and Product Design Education, 6 & 7 September 2018, Dyson School of Design Engineering, Imperial College, London.

[4] Agouridas, V. Alison McKay, and Alan de Pennington, "Consumer product development: A systems engineering approach to the derivation of design requirements from stakeholder needs", 2004 INCOSE Symposium, June 2004