# Innovation and Uncertainty Systems Engineering and R & D Management: A Manifesto for Industrial Change

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**Abstract**

This talk presents an overview of innovation in industrial R&D and the role that uncertainty identification and management play in the innovation process. Innovation is a key component in the growth of a company — innovation is essential to drive new product and process growth. Innovation is presented in this talk as an output that is the result of combining an idea with an implementation to generate value to the parent company. The ideas associated with innovation can be generated in systematic ways and the generation of a rich set of concepts is critical to the innovation process. Equally critical in the innovation process is the management of uncertainty associated with the concepts and this talk presents the management of uncertainty in the setting of systems engineering. Systems engineering is the management of product and process development from concept to value addition. The identification and management of interfaces — both programmatic as well as technical — especially in the innovation cycle as the product moves from concept to preliminary design — must include uncertainty across the interfaces. This talk presents these concepts with reference to the case of building systems — an infrastructure that is becoming of more importance to both commercial as well as military customers due to health concerns — and is an excellent example of both innovation as well as systems engineering and uncertainty management.