Discussion Forum 2 – Strengths and Weaknesses of Designing a Metamodel to support object-oriented Design

Initial Post:

The metamodel approach to designing IoT systems can be beneficial. The article discusses the varying level of uses and abstraction from starting at a high level and supporting different stages of the lifecycle to more detailed and granular designs. From that aspect, key strengths would include reusability and scalability as well as different model types used at varying stages of the design if requirements and analysis are clear at the start.

It does however introduce several drawbacks or perceived weaknesses. Mainly the fact that there is no published standard for metamodel design so may be challenging to adopt. Additionally, such an approach could lead to varying levels of complexity and risks of becoming redundant as designs and solutions become more agile in their delivery. Investing heavily in a detailed Metamodel could prove costly when a significant change occurs if trying to design too much upfront. The authors conclude that subjects such as security are not tackled. This is a prime example of how a critical aspect of design could be missed or not considered and therefore prove costly to refactor designs, especially with cloud-based IoT, disparate systems and authentication methods.

References:

Fortino, G., Guerrieri, A., Russo, W. & Savaglio, C. (2015) Towards a Development Methodology for Smart Object-Oriented IoT Systems: A Metamodel Approach. 2015 IEEE International Conference on Systems, Man, and Cybernetics. 1297-1302. DOI: 10.1109/SMC.2015.231.

Summary Post:

We discussed many strengths and weaknesses of using a metamodel. Some of the key points were around reusability and consistency but also the cost or perceived expense of an overly complex model.

From a development perspective, the use of UML as a modelling tool for IoT or a system incorporating IoT would be acceptable for the design of a solution. As well as modular components around integrations with IoT devices and connectivity to other layers in an architecture. What resonates is that IoT is still an evolving technology and platform. Until there are some defined standards or practices it would be challenging to design a metamodel if technologies and standards such as functionality, data and security are rapidly changing.

A metamodel however would be more applicable at a more holistic or architectural level where the benefits are validation and governance of how a system or systems are developed and deployed.