Ecosystem Digital Infrastructure

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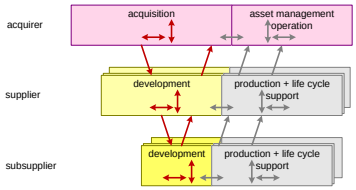

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Abstract

Organizations in an ecosystem need a digital infrastructure that facilitates digital information exchange across organizational borders.

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1 Introduction to Ecosystem Digital Infrastructure

Working in Ecosystems requires a digital infrastructure that supports the communication and information access over the full lifecycle for parties involved in the ecosystem. There are many information flows between organizations. Figure 1 shows a schematic overview of 3 layers in the ecosystem and the information flows between and within layers.

At the top we start with the acquisition organization. The acquisition organization is often paired with an organization that takes care of the lifecycle for the systems. This lifecycle support manages the assets and operates the systems. These organizations have much internal structure, with information flows up and down and between organizational entities. The arrows in the boxes represent information flows.

At supplier and sub-supplier levels we see the same pattern with a development organization and production and lifecycle support.

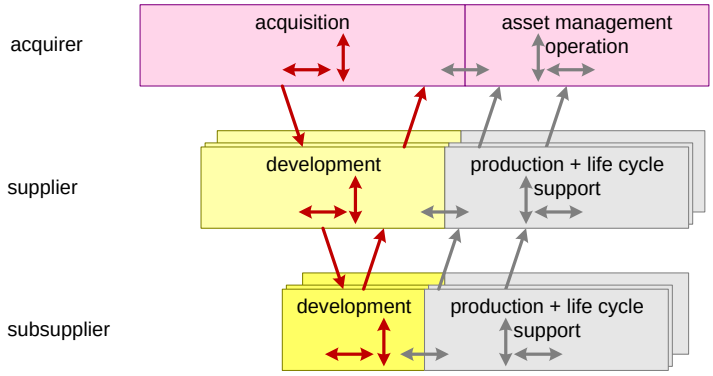

Figure 1: Information flows between organizations

2 Introduction to Ecosystem Digital Infrastructure

We can see the layers as a repeating pattern of producers that deliver to consuming organizations. For example from supplier to acquirer and from sub-supplier to supplier. Managers and legislators tend to reduce this relation to a hard birder with a specification between the parties that defines the delivery. The design flow is that the consuming organization does a request for proposal using a specification. The supplier responds with an answering specification for what they will deliver. The asking and answering specification should match.

Figure 2 shows this design flow at the top. The integrator sees the supplier delivery as one of their subsystems, while the suppler sees it as their system. In the

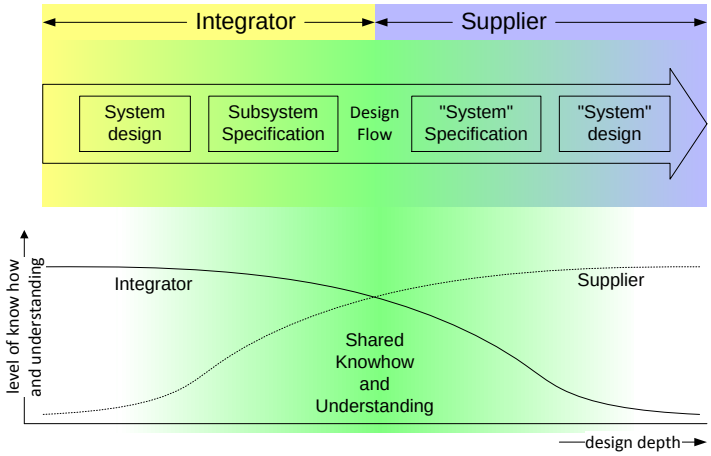

Figure 2: The relation between a supplier and an integrator

mind of many people the whole interface is this delivery specification. However, as architect, we often need to know what is at the side of the border.

Figure 3 elaborates this relation further. This knowledge is there to make appropriate choices and to be able to assess opportunities and risks. When producer and consuming organizations recognize each other as partners, a much more healthy exchange of shared knowhow and understanding is possible. This requires embedding in mutually recognized processes, such as acceptance procedures and tests, and natural mapping of intellectual property. However, all overriding for success is trust between partners.

3 Information flows and the V-model

Figure 4 shows an extended V-model. The horizontal pink bars on top are the activities of the acquiring organization. Below the larger V-model a smaller copy represents the activities in the sub-supplier. Throughout the entire V-model stakeholders exchange much information. There are many borders in the flow, where stakeholders handover information. The figure indicates critical boundary transitions with numbers.

0 Life cycle stakeholders - acquisition in the acquisition organization tend to be separate organizational entities with different cultures.

1 Acquirer - supplier are different economic and legal entities with own interests, typically each with its own digital infrastructure.

2 Marketing, architect - engineer within the supplier have different cultures, habits,

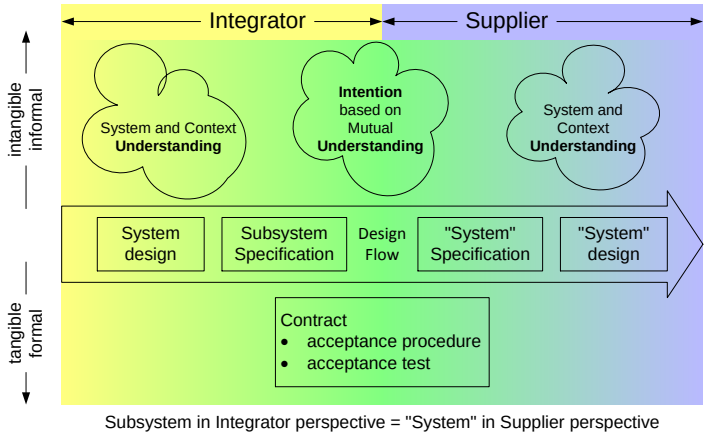

Figure 3: Critical Success factor between a supplier and an integrator: mutual understanding and trust

and responsibilities, often in separate organizational entities.

3 Supplier - sub-supplier , often a primary interaction between purchasing and sales with a negotiation attitude.

4 Sub-supplier - supplier where documentation can be extensive during engineering, however also during the entire lifecycle. These are different economic and legal entities with own interests, typically each with its own digital infrastructure.

5 Engineer - industrialization within the supplier, however, sometimes separate organizational entities using different digital infrastructure because they have different applications and needs.

6 Engineering - lifecycle support within the supplier, however, separate organizational entities using different digital infrastructure because they have different applications and needs.

7 Supplier - acquirer During the entire lifecycle. These are different economic and legal entities with own interests, typically each with its own digital infrastructure.

4 IT-tools and infrastructure

When we go deep into the engineering organizations in suppliers and subsuppliers, there are specialized digital infrastructures for the various technical

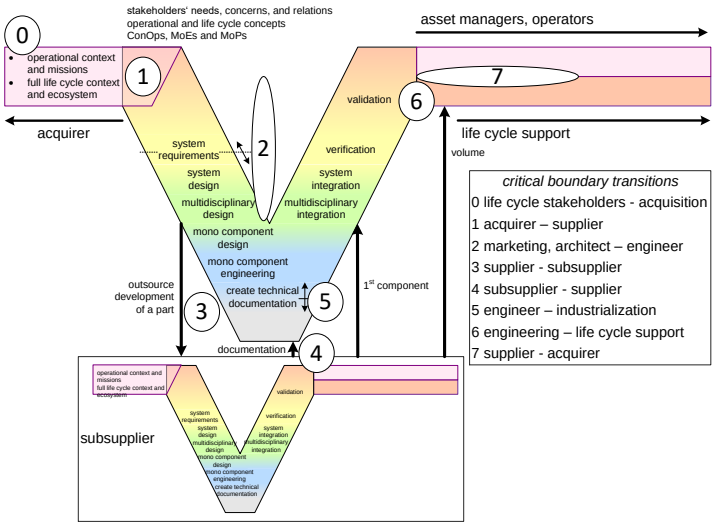

Figure 4: Critical boundary transitions in the V-model

disciplines. Such infrastructure has repositories and dedicated computer assisted tools. Figure 5 shows these digital engineering environments.

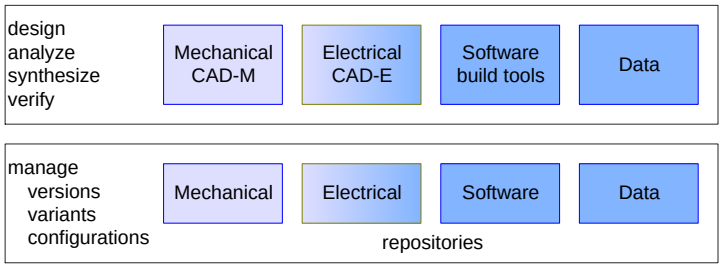

Figure 5: Digital mono-engineering environments

Figure 6 extends the map of tools for a supplier. In development, there is a rich variety of IT tools at system and organization level. For all repositories, version and configuration control is essential. Unfortunately, many organizations have hybrid infrastructures with less structured stores, e.g. shared drives, up to fully functional repositories. In the product and life cycle support, there are also many IT applications. Here ERP is often a central repository connected with most other applications.

Figure 7 completes the map to the same layers as Figure 1. The multitude of tools, handovers, and organizational boundaries explains why the current digital infrastructure in ecosystems is functioning partially at best. Be aware

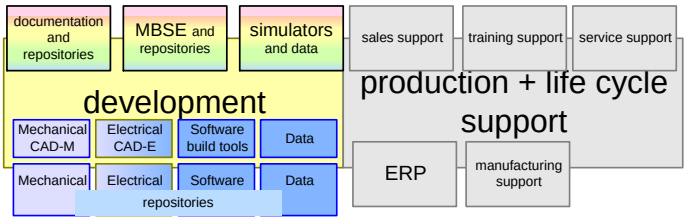

Figure 6: IT-tools at a supplier

that this pattern extends to many ore parties in the ecosystem.

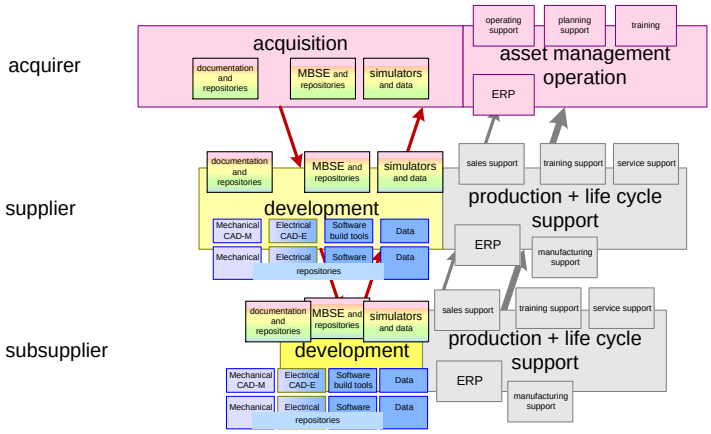

Figure 7: IT-tools across layers

References

[1] Gerrit Muller. The system architecture homepage. `http://www.gaudisite.nl/index.html`, 1999.

History

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- added article

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- Created, using a subset of ChallengesOfDigitalEngineering and FromFuzzyToSmart