



From contradiction to **breakthrough!**

Agile Systems Engineering – from contradiction to breakthrough

It is no longer possible to separate agility and Systems Engineering. This applies to the consumer market all the way to large-scale military procurement projects. Systems Engineering is usually the stabilizing backbone while agility provides flexible leverage for interdisciplinary collaboration, early customer involvement and thinking in levels of viability (MVPs). From contradiction to breakthrough – if some key challenges can be overcome:

We are in the middle of a product world transformation. Software centering, products networking and thinking in increasingly complex systems are changing the rules of the market. To faster launch customer-focused yet robust products, companies need to develop new strategies and integrate agility into their existing Systems Engineering approach. A look at the underlying principles shows that this is not a contradiction. The challenge is translating spanning principles into definite, company-specific instructions that include all company levels. The following determining levers can help:

1 Consideration of agility during contract design already

It is extremely worthwhile to invest in close, trusting cooperation with partners, customers and suppliers. Exploring agile degrees of freedom during the contract drafting phase is perceived as particularly valuable. The contract becomes an instrument to create transparency in development collaboration early on. It becomes apparent which system elements can still be changed with agility and which must be regarded as fixed or unchangeable.

2 Early and ongoing requirements management

It is crucial to swiftly and continuously include approval-relevant, quality-relevant and cultural aspects in the set of requirements along with purely technical requirements. The requirements serve to build trust with the customer to form a common basis for decision-making and to commit all those involved in a

common vision of the objective. This creates a basis for traceability between requirements, architecture decisions and product validation – parallel to the agile “One team” concept.

3 Modular system architecture as the supporting structure for agile iterations

In Systems Engineering there is no getting around system architecture. As a basis for complex system designs, it should be modular in both hardware and software parts. Architecture development and management will take on greater significance in the agile development environment. Iterations and releases will not work if changes are made simultaneously to the overall system. However, if system elements can be cut clearly on the architecture side and interfaces can be defined reliably, new developments and advancements can be implemented more quickly in an agile rhythm – without

jeopardizing the consistency of the overall system.

4 Model-based overall system design as an enabler of agility

The product world is changing along with the rules of the game. Instead of waiting for customers to collect and consolidate their requirements, information from relevant sources can be analyzed and converted into a database through processing in advance. This can be used to develop an initial, modeled system design which can then be detailed and fleshed out in agile teams. Until now, modeled concepts were often isolated solutions for domains or specialist areas and not prepared as a holistic, central system model. Modeling the system as a whole requires a mutual language. This no longer needs to be imposed on developers. Digitization and automation take on the role of universal translator in the background – developers can focus on their value creating work driven by an agile rhythm.

5 Improved collaboration and participation through agile cadence and synchronization

A Systems Engineering-savvy sensor provider is breaking new ground by introducing agile operating principles. The insight: “There is no chaos. Developers do not forget their technology skills when the rhythm of the work changes.” Regardless of the individual level of agility, cadence and synchronization play a crucial role in the joint alignment of the content and the timing (“drumbeat”) of all participants. It is important to budget time for the learning curve at all organizational levels because agile working requires proficiency, courage and the development of new behaviors and a new mindset.

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