MATLAB EXPO

Bridging the Gap Between Systems Engineers' Architecture Models and Model-Based Design

Gaurav Dubey - Principal Application Engineer



Key Takeaways

Unified environment with no data duplication enabling:

- Optimization through analysis and simulation
- Communication with various stakeholders using focused views
- Responding to changes through the digital thread





System Engineering Workflow



Mapping the problems users report with their current tooling



Typical (simplified) System Engineering Workflow

Stakeholder Needs

Requirements

Architecture: Structure & Behavior

> System Characteristics

Multiple Viewpoints







How does this common approach of System Engineering work







Start with a basic set of Stakeholder Needs







Requirements define what the system shall do

Stakeholder Needs

Requirements

Architecture: Structure & Behavior

> System Characteristics

Multiple Viewpoints



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#6: Target Color

The target shall be a ball that is green in color

#8: Mission Duration

The system shall be capable of persistent target tracking for greater than or equal to 4 minutes.

#9: System Size

The aircraft with attached payload shall fit inside a 15cm x 30cm x 8cm container.





Identify WHAT the System should do and HOW the system is built







Perform Trade Study to Compare Different System Components

Stakeholder Needs

Requirements

Architecture: Structure & Behavior

> System Characteristics

Multiple Viewpoints



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DIY Mini Drone



Tello



Parrot Mambo





Views are used to simplify complexity







Views are used to simplify complexity

Stakeholder Needs

Requirements

Architecture: Structure & Behavior

System Characteristics

Multiple Viewpoints



- Architecture models can be complex
- Spaghetti models are just as problematic as spaghetti code





Views are used to simplify complexity

Stakeholder Needs

Requirements

Architecture: Structure & Behavior

> System Characteristics

Multiple Viewpoints



- Architecture models can be complex
- An Architecture View can simplify the diagram to contain only the relevant parts





| Stakeholder Needs | | | | | | |
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| Stakeholder Needs | Software View |
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| Requirements | GUI Video Processing |
| Architecture: Structure & Behavior | CITEDUALTTOCESSO |
| System Characteristics | |
| Multiple Viewpoints | |
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Design and Implement the System





Unified Environment for MBSE and Model-Based Design



MathWorks[®]

Now let's see it in action

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Requirements Engineering

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Creating and Applying Interfaces – Top Down

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Creating and Applying Interfaces – Bottom Up

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Facilitate Analysis & Trade Studies

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Simplifies Complexity: Live Views for Design Trades

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Simplifies Complexity: Communicate Effectively with Stakeholders

Enables Implementation: Environment for Architecture and Design

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Digital Thread - Navigation

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Digital Thread – Responding to change

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