



Model-driven Architecture building for constrained Systems

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ARCADIA Method

- Integrates unique adaptation capability to domains,
- and capitalisation means

- Adds process & method for efficient, scalable industrial use
- Defines original tooling support



Support for collaborative Architecture building





Summary of ARCADIA principles & capability





An example of Modelling & Validation: In-Flight Entertainment System

Communications

T •Series

Playing videos on demand

Listening to music Surfing the web Gaming...

WELCOME aboard

HALES AIRLINE OPERATIONS ENTER Tracking the performance o

he IFE system is a critical part of



TopConnect TopEffects TopServices

Madin

Support





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Non-functional Viewpoints Analysis

Decorate operational/functional analyses with N-F constraints & Need



Design Rules

common architecture for each Viewpoint: Componer e dedicated model output Capture domain know-how on

- quantitative behavioural computation algorithms
- architecture checking rules
- Analyse each candidate architecture against viewpoints, locate defects and correct

Viewpoints e.q. : •interfaces, data model Performance Safety Security •IVVQ •Reuse/product line...

Verification / Validation Criteria







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Safety non-functional Viewpoint



1° Automatic analysis: Architecture EPBS

-Rule: "*No single source for* ransition to sub *major failure condition*" -Not met for video

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Operational Analysis

Functional

Analysis Logical

Architecture

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Non-

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Multi-Viewpoints Trade-off

Confrontation rules for multi-viewpoints trade-off













Energy & Thermal system Of a commercial Aircraft



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Three interleaved, multi-physics Models



Power Model dedicated Viewpoints

Power & Thermal performance

depending on flight phase consumption, incl. Overloaded components detection based on power computation, linked to thermal Model

Safety / Integrity

incl. Failure containment, redundancy rules & analysis, failure scenarios & propagation, monitoring efficiency, shielding...

Reliability & Availability

incl. Reliability computing, reconfiguration issues, flight delay...

Spatial (3D) arrangement

Early identification of spatial arrangement constraints impacting the architecture

And also: Mass, Cost, Reliability...



Viewpoints <

Solution Architecture



Conclusion: Return of Experiment

Early validation of key architectural aspects Less rework in design & production

Efficient decision making regarding complex but necessary architectural trade-off Improved quality of architecture

- Support to negotiation and compromise between stakeholders
 - Ability to capitalise both product definition and knowhow





Conclusion: Return of Experiment

Support to interoperation with Customers & Suppliers

Interoperability with and beyond Standards Support

Benefits and guidelines for foreign tools integration, esp. simulation and specialty tools

Ability to adjust modelling effort:

- scaled/focused on major engineering issues for return on invest
- Without exhaustive modelling

