## Embedded Systems Innovation — BY TNO

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# Model Based System Architecting (MBSA)

**Systematic quantitative early architecting**

## Conclusion

Increasing system complexity results in more interactions, particularly at the hotspot of the System Architects domain. MBSA provides a systematic approach to structure architectural information. Concreteness provides insight and transparency on status and decisions.



*How do we get concreteness at architecting level in ever growing systems?*
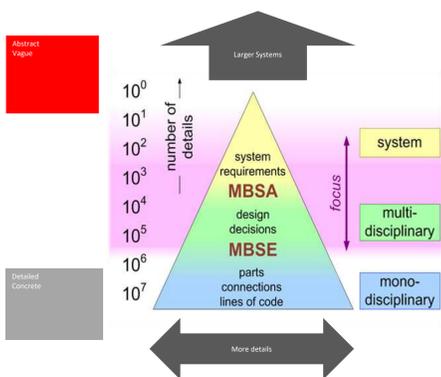
## Increasing system complexity

In the past decades, the typical system size grows from 7 decades of decomposition towards 8. For the future we may expect even more than 9 decades. Architecting and reasoning becomes increasingly difficult.
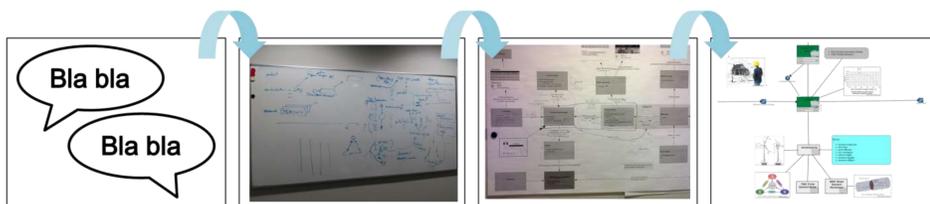
## Combine abstract with concrete

- The architecting domain spans up to 3 orders of magnitude, but the human mind covers 1 order.
- To bridge this gap, the human mind connects abstract with vague and detailed with concrete.
- MBSA supports reasoning at abstract but concrete level.
- MBSA solves this by extensive use of executable models in combination with the comprehensive structure.

| Abstract-Vague | Abstract-Concrete |
|---|---|
| Detailed-Vague | Detailed-Concrete |

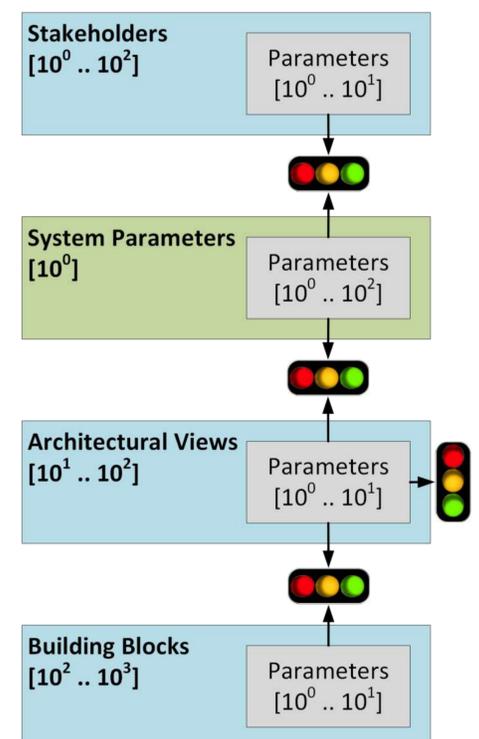*Models are a mean to reason abstract while maintaining concreteness at the same time.*



*Towards concreteness in four steps*

## The MBSA structure

- To apply executable models as a first class citizen in architecting, the MBSA Structure has been defined.
- There are 4 layers, devised into Architecting Domains. Such Architecting Domain has an owner who is fully responsible for the choices and alternatives (exploration).
- An important aspect are the Traffic Lights, which decouple all Architecting Domains. Each responsible architect can now make his own analysis, what-if questions and trade-offs. The overall consistency can be seen by the Traffic Lights. This provides full transparency at all times.

*The MBSA structure provides a transparent way in taking decisions.*



Stakeholders $[10^0 .. 10^2]$ — Parameters $[10^0 .. 10^1]$

System Parameters $[10^0]$ — Parameters $[10^0 .. 10^2]$

Architectural Views $[10^1 .. 10^2]$ — Parameters $[10^0 .. 10^1]$

Building Blocks $[10^2 .. 10^3]$ — Parameters $[10^0 .. 10^1]$

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