ARTEMIS Project **MBAT**: Advanced Validation & Verification of Embedded Systems





The public private partnership for R&D actors in embedded systems



## **MBAT's overall Challenges**



- V&V technologies are still not effective and efficient enough
- V&V costs for Embedded Systems are too high (still up to 50% of Embedded System's total development costs)
- V&V technologies should improve the error detection rate





MBAT's Key Technological Solution



MBAT = Combined Model-based Static Analysis and Dynamic Testing of Embedded Systems





# Main results of MBAT on V&V Methodologies



## Results:

we can definitely achieve V&V cost reduction by applying MBAT A&T technologies combining static analysis with testing, e.g. by focussing testing on the basis of static analysis results and earlier removal of errors discovered already by early static analysis

the probability of error detection is increased by a more intensive coverage of the system under V&V using a combination of model-based A&T in form of MBAT technologies\*

\*We cannot seriously claim that we can uncover more errors for sure

HIL Test Environment © D



## MBAT Technological Approach – From Workflow via Patterns to Tool chains

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Abstract **work flow**, many flows possible

Apply **A&T patterns** as e.g.

- first uncover all boundary value errors statically, then test the remaining cases
- first detect static flaws, then concentrate on testing these flaws

Use A&T tools chains as e.g. Astree→Embedded Tester→PROVEtech:TA, and integrated via the MBAT RTP & IOS



## (Solution) Patterns describe

- generic solution core
- for a recurring **problem**
- in a given **context**
- **Best practice!**

## **A&T-Patterns**



**MBAT A&T Patterns** 

#### **MBAT A&T Patterns**





 17 Patterns (with their interrelations) defined and available publicly from

#### http://mbat-wiki.iese.fraunhofer.de



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#### **MBAT RTP & IOS**



Reference Technology Platform and Interoperability Specifications







#### MBAT RTP Tool Landscape



MBAT Technical Items Released (Total: 172) for 20 Industrial Use Cases	
Innovations in testing tools and test-case generation	49
Innovations in static analysis tools	33
MBAT methodology development	32
OSLC/IOS adaptors and IOS services	58





**MBAT** Results

(see www.mbat-artemis.eu)



reduce costs for V&V by at least 15%

possible to



#### CP-SETIS: Towards IOS Sustainability



H2020 Coordination Action kickstarted in March 2015

- Goal 1: The alignment of all IOS-related forces within Europe to support a common IOS Standardization Strategy
- Goal 2: The definition and implementation of sustainable IOS Standardization Activities

If you are interested for supporting our activities (as associated partner) → Visit us at Level C / booth 78!

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