

# Hardware SPICE - When electronics development becomes part of our system

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## When electronics development becomes part of our system





#### What is Hardware SPICE?



Software Process Improvement and Capability dEtermination

Identify possibilities to improve your development processes

Check the capability of your development processes



## How is "hardware" defined?





## What is the difference between system, hardware and product development?





## How does hardware development work?





# What is the difference between system, hardware and product development?

- Can we use SPICE also for tool development?
  - Tool development is not part of the model
- What about electromechanical components (e.g. coil windings)?
  - For "SPICE" this is still a combination of Hardware and Mechanics, and therefore a System



- Is it necessary to split electromechanical components for a better mapping to SPICE?
  - SPICE provides only a basic structure. It does not describe a mandatory structure
- What processes should be used in that case?
  - Use the notes, to combine the models



# What does an example of HW development look like?





## How do Automotive SPICE<sup>®</sup> and Hardware SPICE work together?

Assessment Agenda (Example):

- Kickoff
- Interviews "Project Management" How are activities and resources planned and monitored in development?
- Interviews "System Development"
- Interviews "Hardware Development" Participants: HW designer, FMEDA experts, Manufacturing, HW test, ...
- Interviews "Configuration Management" How are the results of the development controlled and directed?
- Interviews "Dealing with problems and changes " How are changes and problems controlled in the course of development ?
- Interviews "Supplier Monitoring" How are the tasks delegated to external parties tracked?
- Interviews "Quality Assurance" How is the quality of the development results ensured ?
- Presentation of results



This refers to the complete development!





#### What does an assessment result look like?



	Capability Level	1	2		3		4		5		
	Process Attribute Process	PA 1.1	PA 2.1	PA 2.2	PA 3.1	PA 3.2	PA 4.1	PA 4.2	PA 5.1	PA 5.2	CL
MAN.3	Project Management	L	F	L	L	Р					1
SUP.1	Quality Assurance	Р	Р	L	F	Р					0
SUP.8	Configuration Management	F	F	F	N	Ν					2
SUP.9	Problem Resolution Management	N	N	N	L	N					0
SUP.10	Change Request Management	Р	Р	N	L	N					0
SYS.1	<b>Requirements Elicitation</b>	F	F	F	F	F					3
SYS.2	System Requirements Analysis	F	F	L	F	F					2
SYS.3	System Architectural Design	F	L	L	F	L					2
HWE.1	Hardware Requirements Analysis	L	L	L	L	L					1
HWE.2	Hardware Design	L	L	Р	L	L					1
HWE.3	Verification against Hardware Design	Р	Р	Р	Р	Р					0
HWE.4	Verification against Hardware Req.	L	Р	Р	L	Р					1
SYS.4	System Integration and Integration	L	Р	L	L	Р					1
SYS.5	System Qualification Test	L	L	L	F	L					1
SPL.2	Product Release	F	L	F	F	L					2

## How do IATF 16949 and SPICE differ?



	IATF 16949 (based on ISO 9001)	Hardware SPICE					
Content	Quality management system requirements for automotive production and relevant service parts organizations	(Software) Process Improvement and Capability Determination for Hardware Engineering					
Objective	<ul> <li>process oriented QM system</li> <li>continual improvement</li> <li>defect prevention</li> <li>reduction of variation and waste in the supply chain</li> </ul>	<ul> <li>identify process improvements for development processes</li> <li>determine capability of development processes</li> </ul>					
Method	Audit (according to ISO 19011 and VDA 6.3)	Assessment					
Result	Cerificate	Process and Capability Profile (see module 5)					
Mapping	The generic requirements for "Operation" (Chapter 8.2 – 8.3) of the IATF can be mapped to the indicators in Hardware SPICE. While the IATF only defines generic requirements in their subchapters, SPICE will add contendependencies and recommendations for the implementation						
Importance	The IATF is an established and mandatory precondition in Automotive.	Hardware SPICE is used mainly internally for improvement but will be required by customers in the future.					
- AMA	As SPICE delivers more details about the suitability of the used processes and identified improvements, the results of assessments are often expected in IATF audits!						



#### Hardware SPICE and the ISO 26262



Although the ISO 26262 has been available long before Hardware SPICE has been published, the idea is

- SPICE defines the structured approach
- The ISO 26262 only gives the addons, to be implemented in functional safety development plus recommendations on methods

Remark: Hardware SPICE includes a couple of references to content of the ISO 26262!



## What experiences are there already?



#### **Challenges**

- Difficult mapping of the processes, since development processes often do not correspond to the structure of Hardware-SPICE
- The terms from Hardware-SPICE are rarely used in reality and have to be "translated": e.g. architecture



- The handling of complex hardware (make-or-buy decision and integration) is not defined in Hardware-SPICE, and have to be handled with SYS-processes of Automotive SPICE<sup>®</sup>
- The interface to manufacturing is rarely defined in Hardware-SPICE
- Safety and Cybersecurity expect a structured approach that need to be established

#### What experiences are there already?



#### **Benefits**

- A better understanding of the process is generated through the interviews
- Possible improvements are recognized based on identified risks and problems
- It enables better communication between the (distributed) teams (process interfaces)



- Synergies can be better used (similar approaches)
- We are ready for the future "Customer requirements regarding Hardware-SPICE will change!"
- We are ready for the implementation of Safety and Security (established processes)







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#### **Next training dates**

intacs<sup>™</sup> Certified Provisional Assessor (Automotive SPICE®) 31 Jan – 4 Feb, 2022, online, English

intacs<sup>™</sup> Introduction to VDA Automotive SPICE<sup>®</sup> Guidelines 8 Feb – 9 Feb, 2022, online, English

intacs<sup>™</sup> training for the "Automotive SPICE<sup>®</sup> for Cybersecurity" Model 28 Feb – 2 March, 2022, English

intacs™ Certified Provisional Assessor (Automotive SPICE®) 7 March – 18 March, 2022, online, English

10 half days instead of 5 full days, daily from 8:00 a.m. - 12:00 p.m. (EST) / 2:00 p.m. - 6:00 p.m. (CET)

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