



Tool Qualification
Experiences

Joachim Albertz
KUGLER MAAG CIE GmbH

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About Us

We are an independent consulting company committed to assisting our customers in the area of **sustainable performance improvement**.

Our **international** team consists of approx. **60 experts** ready to assist our customers around the world.

Our Focus

Analysis, assessment, and **improvement** of our customers' value creation processes for products and services.

In addition to methodological consultancy our focus is on operative implementation and systematic, sustained **transfer of know-how**.

We Listen & We Integrate

Together with our customers we develop solutions for today's **process challenges** and prepare for those still lying ahead.

Building on our **experience** we integrate open methods & standards, such as Automotive SPICE®, CMMI®, Functional Safety, Lean, Agile ...

Our Mission

To support our customers in the **management of risks** associated with the development, procurement or delivery of software, systems, and services - while maintaining their **speed of innovation**.



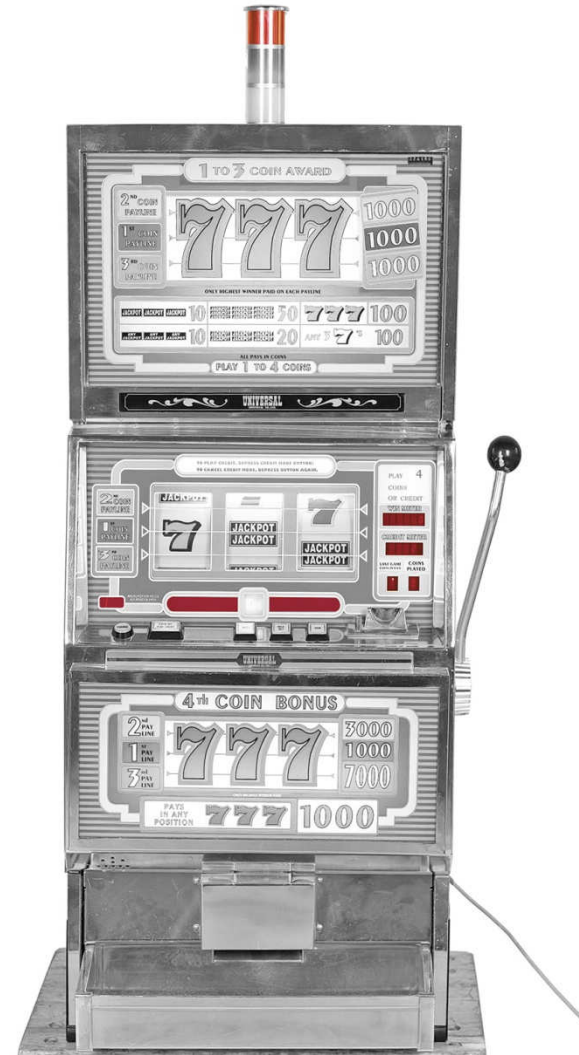
Confidence in Use – Diversity Shapes Practice

- There Is a Large Variety of Tools
 - Do we always need to apply the same degree of stringency?
 - What is a “tool” and what is not?
 - How can I limit the effort if there are version changes?
 - Can we reuse already performed analyses? If Yes, what are the boundary conditions?
- Practice Examples
 - Compiler/Linker
 - Calibration data management
 - Primitive tools
 - Company level



Compiler – The Problem

- Function ... complex!
- Critical for product safety
- Version change ... avoidable?
- Qualification Kits ... available?
- Quality of the development process ... known?
- Configurations, Options, Optimization ...
- Tool output ... manually verifiable?



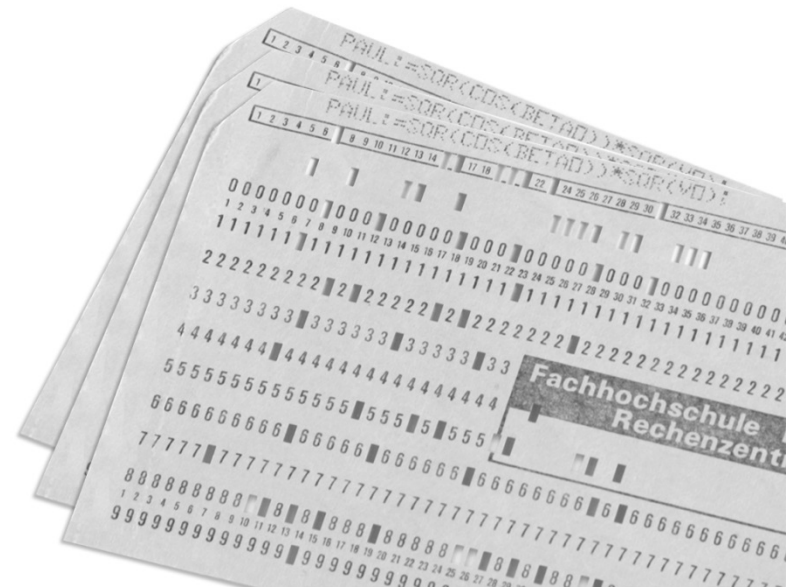
Compiler – Possible Solutions

- Back-to-back Testing
 - Old tool version versus new tool version
 - Tool Qualification not necessary if ...
 - Representative programs are being used
 - Target configuration and target options are being used
- Tool Qualification
 - Alternative 1: Use of qualification kits
 - Alternative 2: Performance of a customized tool qualification
- Note: Use of Tools in Projects must observe
 - Correspondence with the released configuration
 - Changes allowed only after approval by the “Functional Safety Manager”

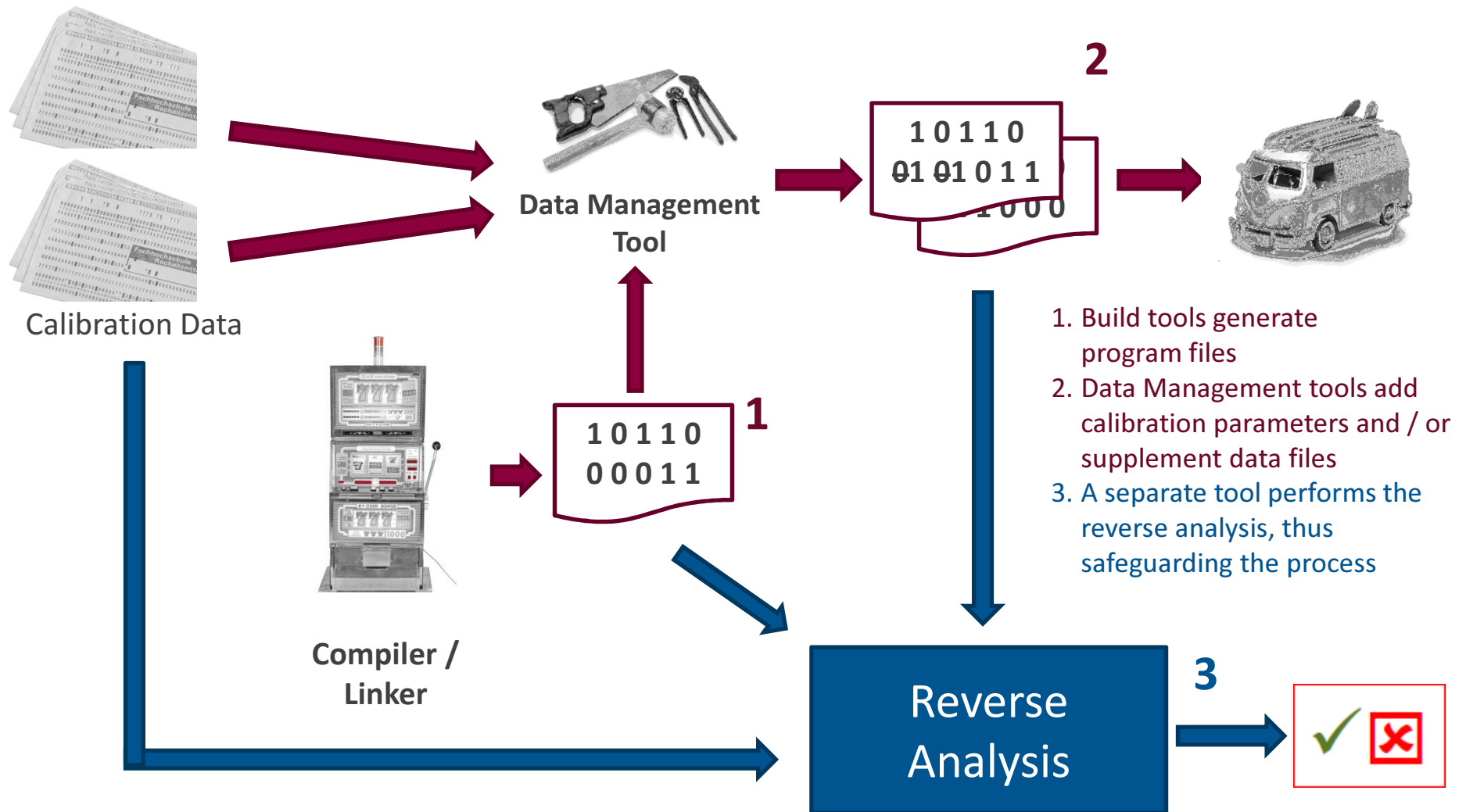


Calibration Data Management – The Problem

- Software is data driven (“Calibration data”)
- Data control is equipment specific, project and customer specific
- Effects of data control cannot always be observed directly
- Data complexity is high
- Tools are often changed
- Often, tool development is not based on standardized processes
- Data control is relevant for functional safety
- Tests performed during development can only partially prove “Confidence in Use”



Calibration Data Management – A Possible Approach



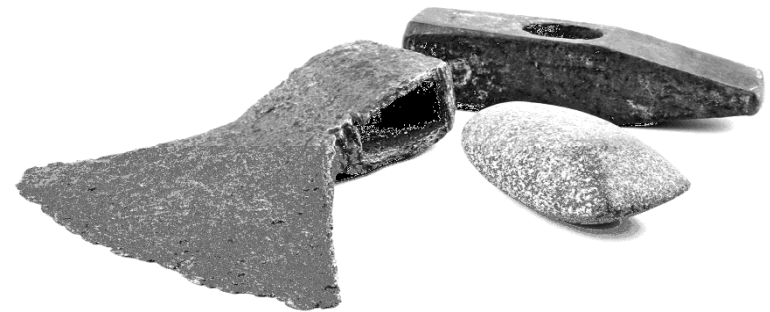
Calibration Data Management– Solution Options

- Tool Qualification Has Its Clear Limits
 - Frequent release changes necessitate frequent repetitions
 - Several tools are being used – often in cascaded configuration
 - The large number of parameters leads to an enormous increase of effort for tool qualification
- To Ensure “Confidence in Use“ We Propose a Variety of Concerted Actions
 - Classification of data criticality
 - Data integrity is verified through clearly assigned tests
 - Tool development needs to be professionalized
 - A diversely developed tool is to be used for “Reverse Analysis“
- How Does “Reverse Analysis“ Work
 - Data management generates its own data package and/or modifies the binary file generated by the tool chain
 - The tool used for “Reverse Analysis“ performs two types of tasks
 - It checks to see whether all the changes represent the source data
 - It checks to see if anything has been changed that should not have been changed



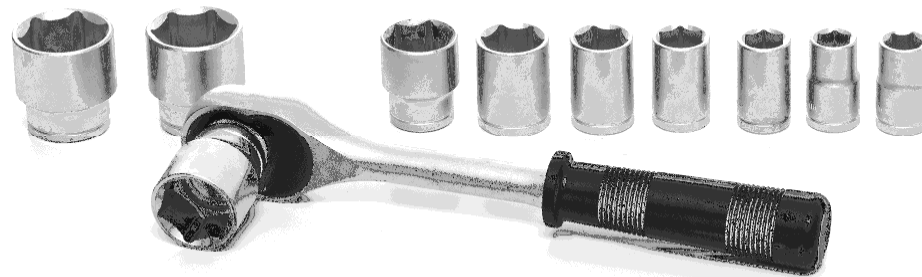
Simplistic Tools (e.g. Excel Macros)

- The Problem
 - All of us use temporary or permanent, simple (though sometimes even quite complex) macros and / or formulas in many places
 - Strictly speaking, these are also tools
 - It is quite impossible to establish a complete list
- How can we apply such tools?
 - Implement procedural overlaps (reviews, tests)
 - Treat activities as if they are performed manually; i.e., accept mistakes, transcription errors, ...
- Implications
 - Limit the use of tools to simple, straightforward tasks that can be easily verified

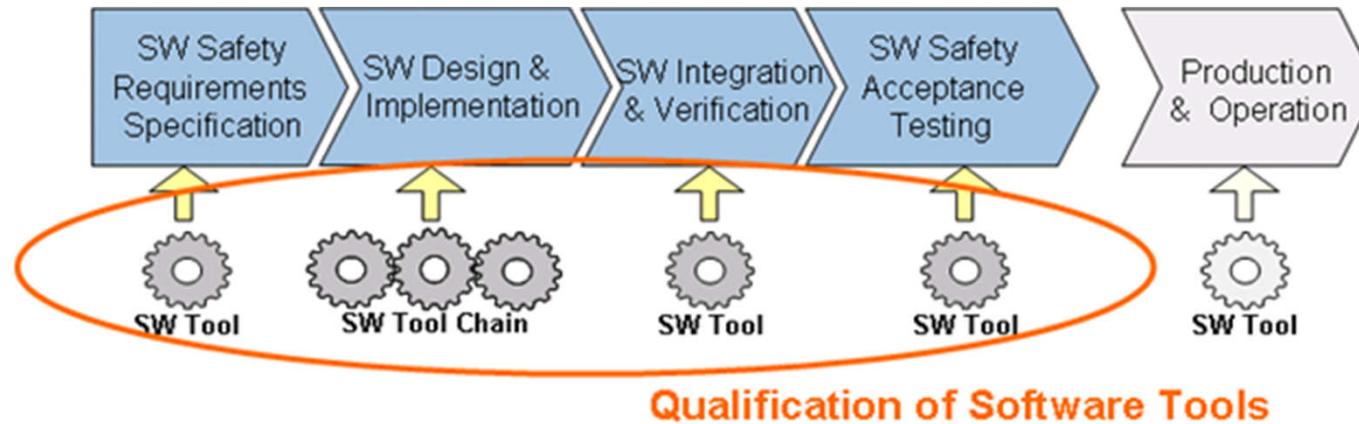


Measures at Company Level

- Initial Situation
 - Many projects use identical or similar tools
 - “Confidence in Use“, however, must be assured in each given context
- Objective
 - Maximize reuse of analyses
- Possible Solution
 - „Confidence in Use“ repository at company level / in organizational unit
 - „Confidence in Use“ repository maintained by a Functional Safety Manager
 - Serves as starting point for all projects
 - Specific analyses per project
 - Releases and necessary confirmation reviews are performed by an independent Functional Safety Manager.



Confidence in use of software tools in development



- There are different categories of cross project supported software tools:
 - Software tools provided by IT on company level
 - Software tools provided by IT mainly for the development areas
 - Development software tools provided by a dedicated group
- Each category requires measures to identify tool confidence levels and possible solutions how to cope with them.



Summary

- Through the reduction of a large number of tools and versions, the "Confidence in Use" requirements of ISO 26262 can be an economically viable proposition.
- **The necessity of explicit “Tool Qualifications” should be minimized**
- If Tool Qualification is unavoidable, version changes should be avoided
 - Test steps during development must be organic; i.e., they must not cause any significant additional costs. Prudent secondary use does make sense
 - However, the quality of the procedural test steps must be realistically assessed
- Manage the “Confidence in Use Repository” centrally to be able to reuse methods and analyses
- Use new tools versions only if necessary and not simply because they are available



Questions? Comments?

KUGLER MAAG CIE GmbH
Leibnizstr. 11
70806 Kornwestheim, Germany
information@kuglermaag.com
www.kuglermaag.com

... *contact me*

Joachim Albertz,
Senior Process Consultant
joachim.albertz@kuglermaag.com
Mobile +49 172 6768 187



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