



# CASSIDIAN

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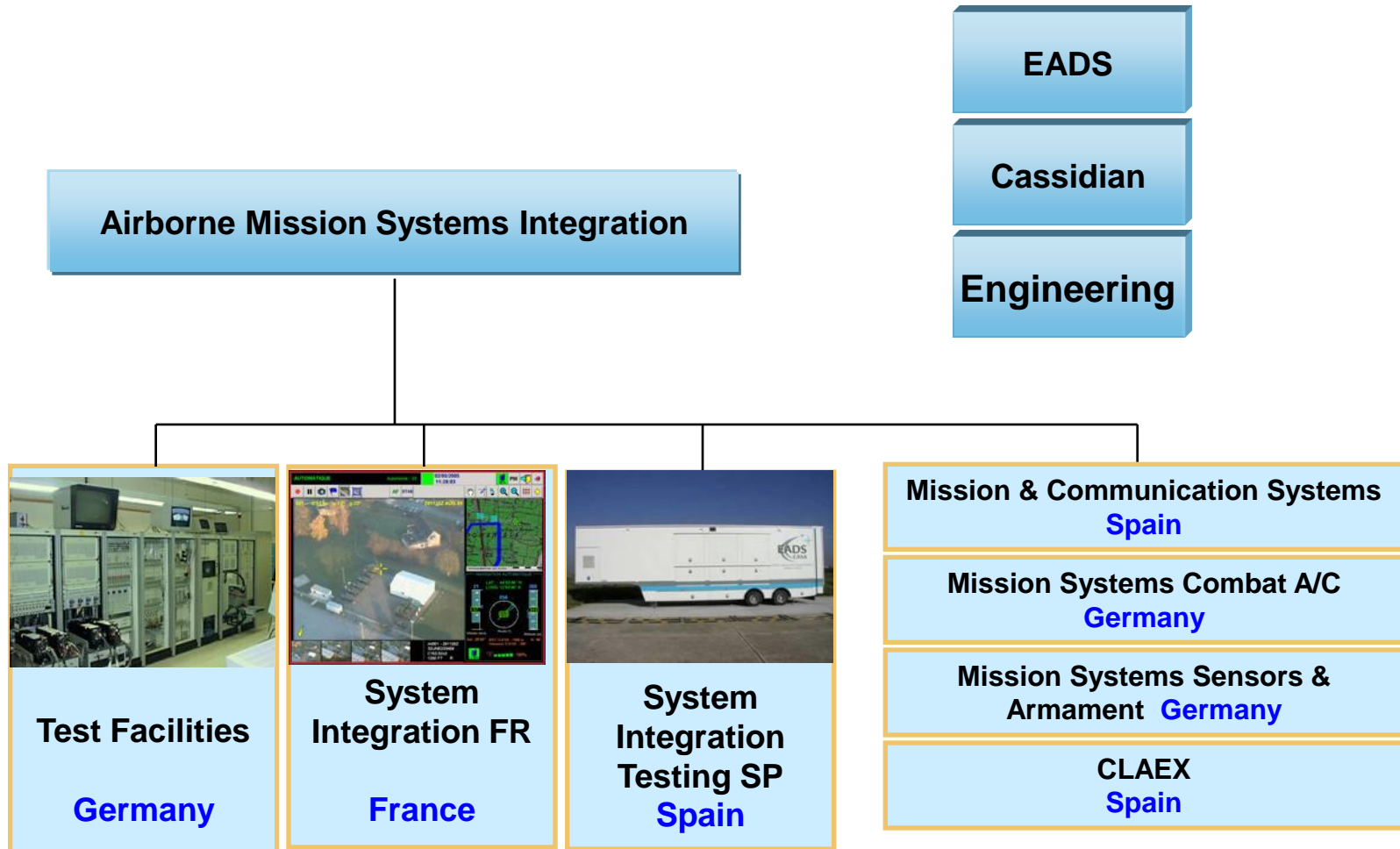
## Automation for Nightly Build Testing

24.10.2013

# Automation for Nightly Build Testing

- Introduction CASSIDIAN Test Facilities
- History and past experiences
- First steps: automate build; automate setup generation
- Version management and connection to source control
  
- Bring everything together
- Model Based Tests integrated in Nightly Build
- Investigation of standard tools
- Benefits
  
- Screenshots of the Tool
- Next steps
- Conclusion

# Introduction Cassidian Test Facilities (1)

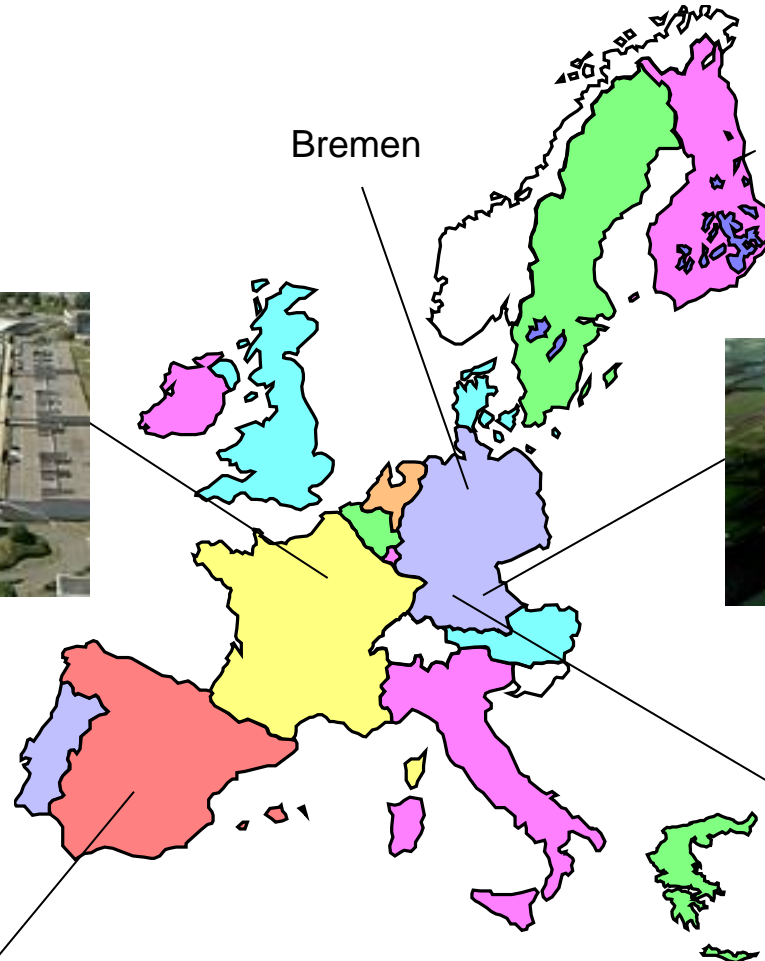


# Introduction Cassidian Test Facilities (2)

Elancourt



Bremen



Manching



Getafe



Ulm



# Introduction Test Support System Family AIDASS®

**AIDASS Integration System:**  
 Basic core for Integration & Test  
 Facilities for commercial and  
 military A/C's and UAV's such as A/C  
 Flight Control Systems and Avionic  
 Systems



**Fully Rugged  
 Aircraft Ground  
 Equipment**

**Rugged or Semi-Rugged Mini  
 AIDASS – VME Based**  
 As in field Test Support System  
 or mobile bus analyser.

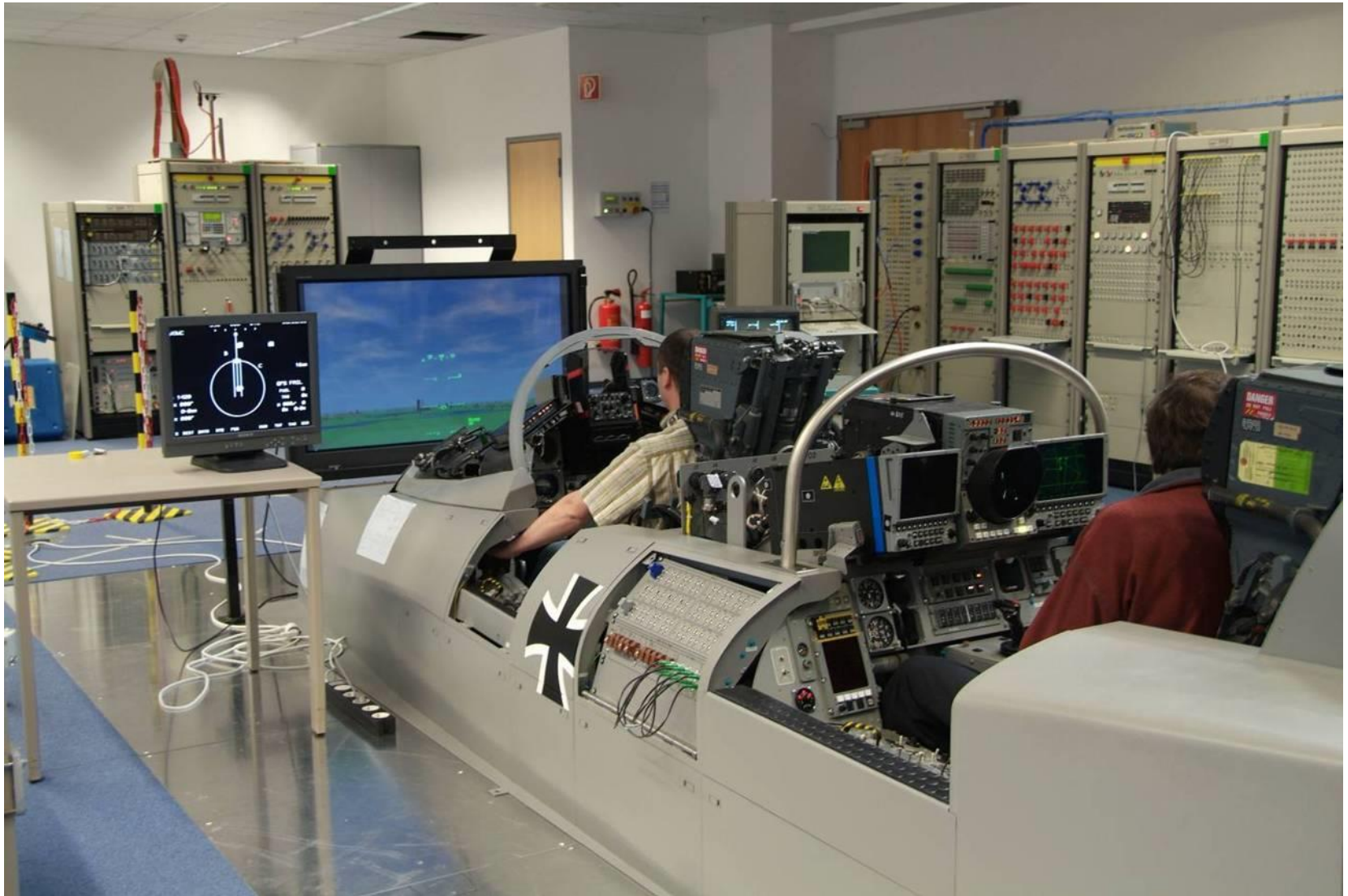


**AIDASS Compact RIG**  
 – VME Based  
 Due to its expandability it  
 can be used as Test Support  
 System for any size of  
 applications

**AIDASS Compact RIG**  
 – PCI Based  
 As Test Support System for  
 medium size applications

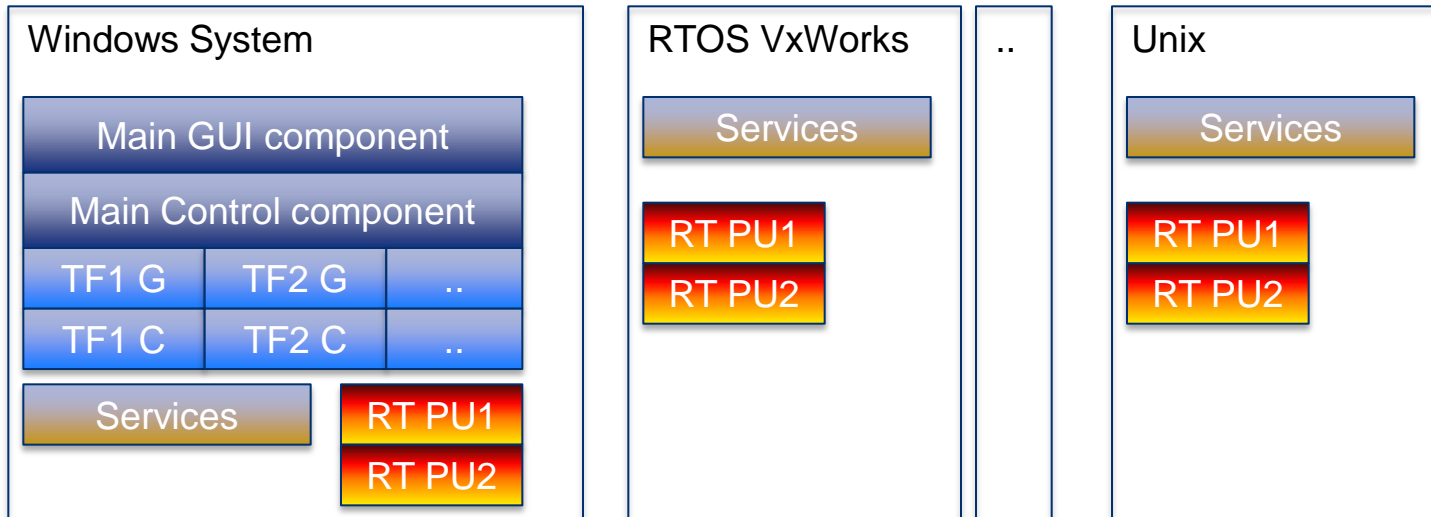
**Mini AIDASS**  
 - up to 7 PCI slots available  
 As Test Support System or as a  
 mobile bus analyser for use on A/C

## Introduction TORNADO System Integration Rig

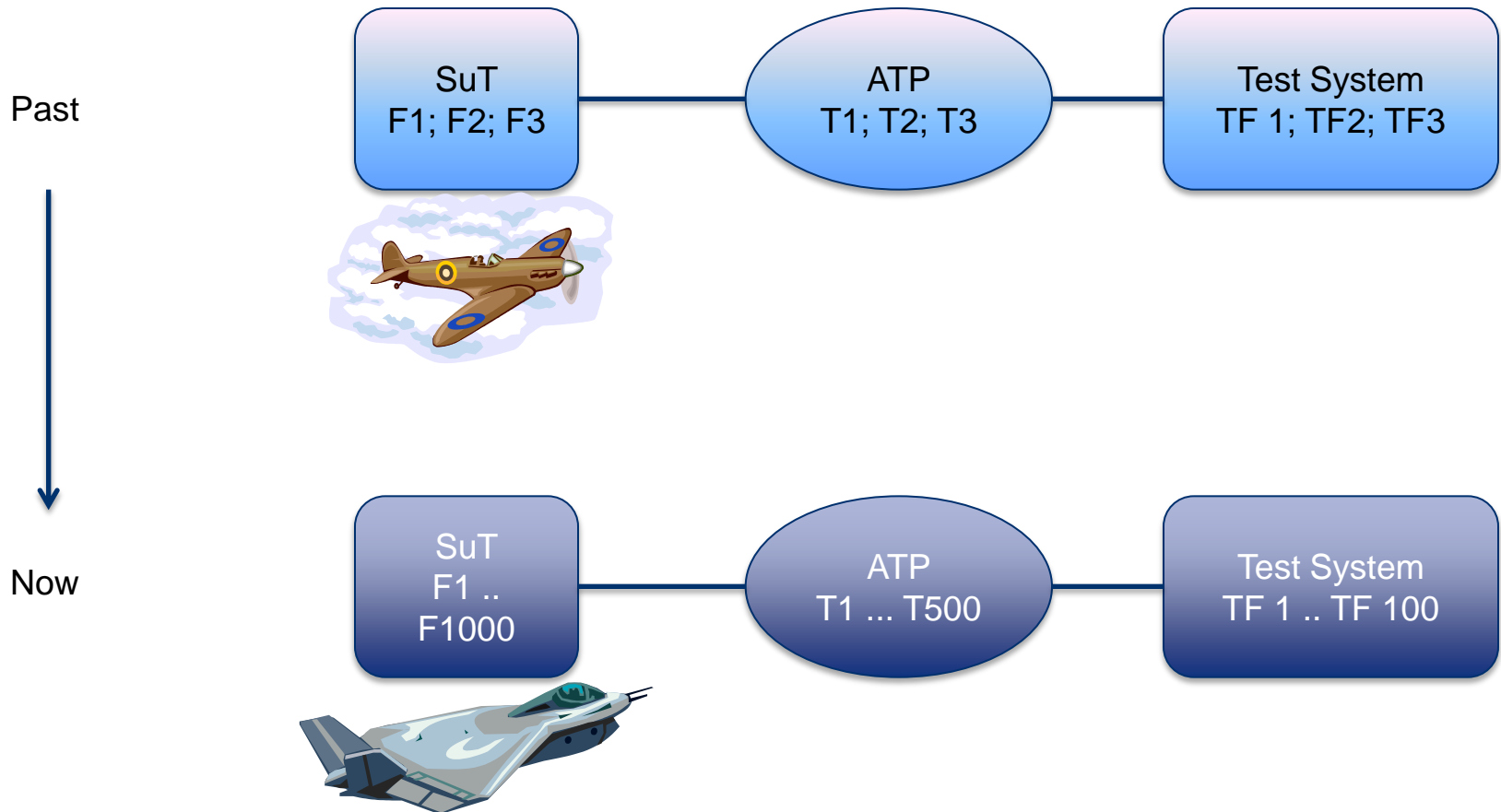


## History and past experiences (1)

- High number of software parts (components)  
Some parts on Windows; some on VxWorks Realtime OS; some on Linux  
Complex built process
- Project gets bigger and bigger.  
One day effort to manually build the system.



# History and past experiences (2)





## History and past experiences (3)

- Four nations project; lead has BAE SYSTEMS  
Predefined parts of the version string  
Difficult version management
- Different customers → Several variants of the system needed  
Even more difficult version management
- Generation of a new version is time consuming and high risk of mistakes
- Late information about errors  
Testing starts after version generation.  
Build of system is time consuming → this is not often done

## First steps; automate build; automate setup generation

- To speed up build → scripts are created  
Each platform has its own build
- Setup generation with script files as well
- These steps save several hours work time
- Most difficult part was the source control.  
Due to many interfaces to the source control (selection of source specs) there haven't been automated scripts in the past.
- These interfaces create the idea of developing a separate tool to coordinate the source control automatism.

```

c:\ MaTE Release Build (VxWorks)
D:/A2k/Software/IC_Commands/IC_Commands.wpj
D:/A2k/Software/IC_DictionaryServer/IC_DictionaryServer.wpj
D:/A2k/Software/RTS_Lib/RTS_Lib.wpj
D:/A2k/Software/UP_Main/UP_Main.wpj
D:/A2k/Software/UP_Messages/UP_Messages.wpj
D:/A2k/Software/UP_Example/UP_Example.wpj
D:/A2k/Software/MC_ModelControl/MC_ModelControl.wpj
D:/A2k/Software/ICU_DISCRETE_CPU/ICU_DISCRETE_CPU.wpj
D:/A2k/Software/ICU_DISCRETE_Messages/ICU_DISCRETE_Messages.wpj
D:/A2k/Software/CH_Server/CH_Server_MaTE.wpj
D:/A2k/Software/REC_Main/REC_Main_mate.wpj
D:/A2k/Software/ICU_COMMON_Messages/ICU_COMMON_Messages.wpj
D:/A2k/Software/ICU_COMMON_Services/ICU_COMMON_Services.wpj
D:/A2k/Software/ICU_ANALOGUE_CPU/ICU_ANALOGUE_CPU.wpj
D:/A2k/Software/ICU_ANALOGUE_Messages/ICU_ANALOGUE_Messages.wpj
D:/A2k/Software/DOR_Main/DOR_Main.wpj
D:/A2k/Software/DOR_Messages/DOR_Messages.wpj
D:/A2k/Software/TF_Global/TF_Global.wpj
D:/A2k/Software/HM_Drivers/HM_Drivers_MaTE.wpj
D:/A2k/Software/A2_HWGlobals/A2_HWGlobals.wpj
D:/A2k/Software/ICU_DES_Messages/ICU_DES_Messages.wpj
D:/A2k/Software/ICU_DES_CPU/ICU_DES_1.wpj
D:/A2k/Software/BTR_Main/BTR_Main.wpj
D:/A2k/Software/BTR_Messages/BTR_Messages.wpj

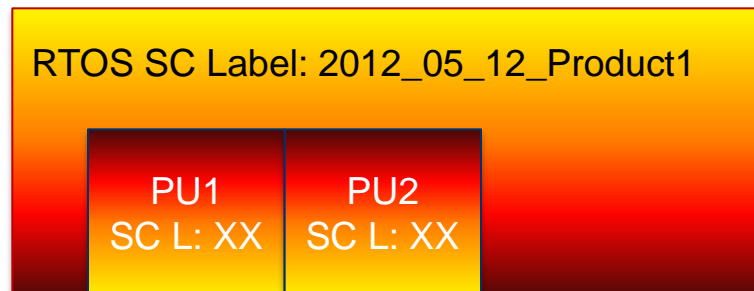
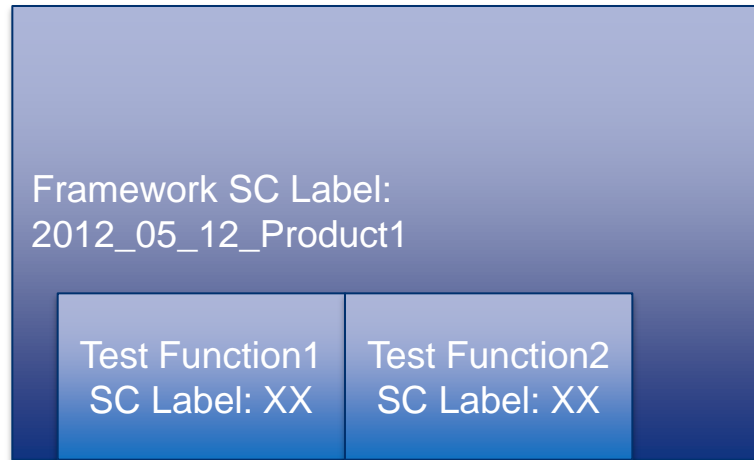
*****
***** Compiling subprojects with 2 CPUs... *****
*****
***** creating archive REC_File *****
***** creating archive REC_Messages *****
***** creating archive REC_Server_IF *****

```

## Version management and connection to source control (1)

- Version management is difficult because of multinational and high number of components.
- Version string partly predefined  
Additionally version string should be different to distinguish product lines
- Two parts: A free text which hold the current version string  
a second text field which holds the name in the source control
- The text entered in the version control tool is used to automatically check the correct installation of all components

## Version management and connection to source control (2)



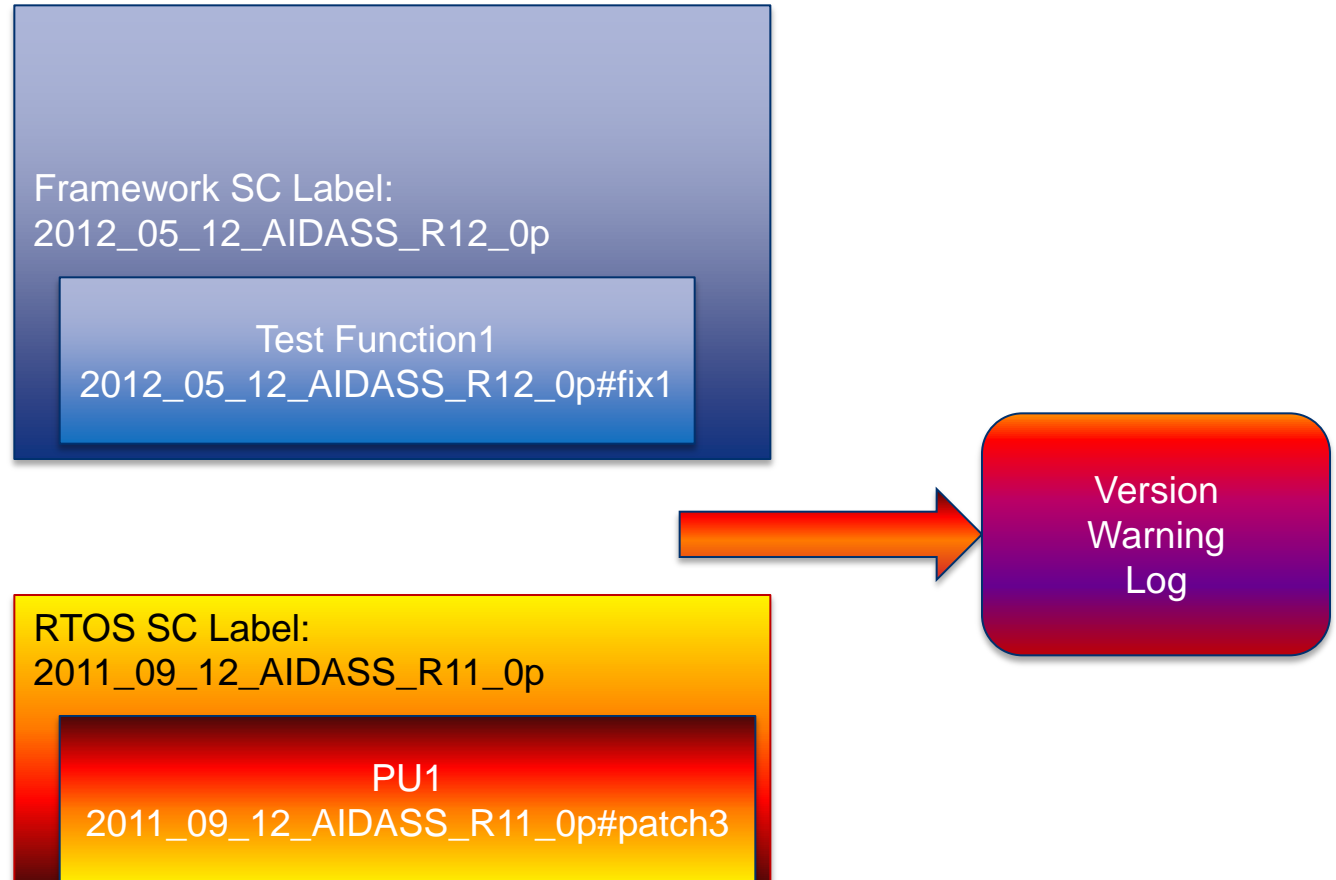
## Version management and connection to source control (3)

### Label String Format



- Label String used for Source Control tool
- YYYY\_MM\_DD\_ProductLine\_Version\_Addon#PatchString
- DD: Day; MM: Month; YYYY: Year;
- ProductLine: AIDASS; TESIS; MaTE; ..
- Optional #PatchString:  
This allows to mix different labels without generating a version warning

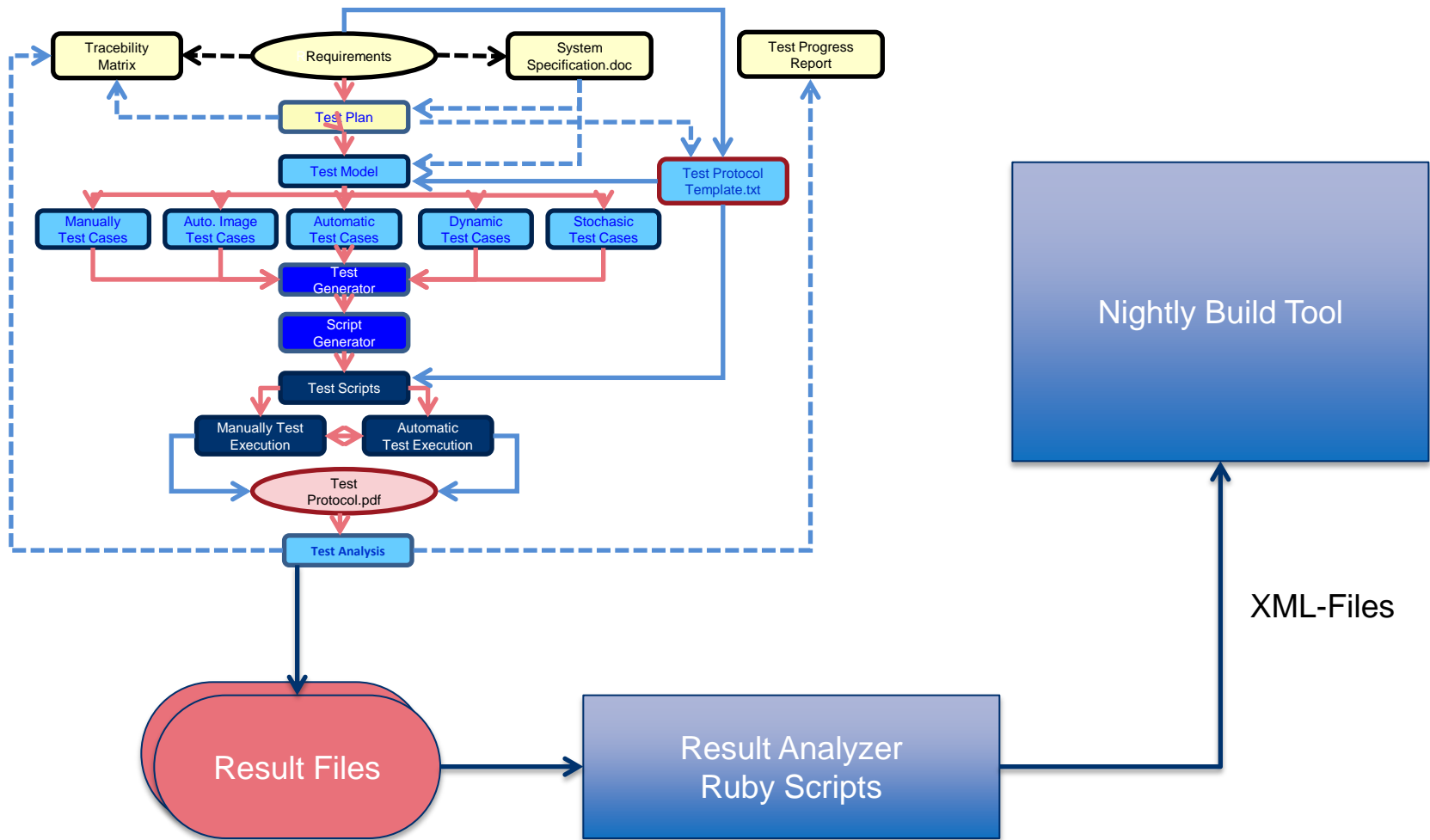
## Version management and connection to source control (4)



## Bring everything together

- JAVA based application with own GUI
- Application interacts with source control  
Build relevant information is available:  
Branches; Checkpoints; Label names; etc.
- Fresh sandbox with all source files is generated  
Calls preconfigured script files
- Source control label information automatically into source files  
used to perform self checks about the used components
- No special build code; setup generation code or error analyzing code;  
Encapsulation with script files
- Model Based Tests could be integrated in Nightly Build tool. Also test reports  
are transported and archived.

# Model Based Tests integrated in Nightly Build





## Investigation of standard tools

Most known tools for this purpose are **Jenkins** and **Hudson**

- 6130 open issues – 651 *critical* or higher, a lot of them older than 2 years  
<https://issues.jenkins-ci.org/secure/Dashboard.jspa>
- Plugin-Interface is not well documented.
- Code Quality:  
*“mostly undocumented code base with lots of open issues in Jira, a huge unmanaged set of dependencies and no test coverage to speak of. From my short glances at the code it looked like a hackish open source project with a few cool ideas but overall little emphasis on quality.”*  
<http://blog.mafr.de/2011/12/27/hudson-vs-jenkins-revisited>
- Available Plugins do not create an advantage compared to the already available own solution.

## Benefits

- Save a lot of time generating a version
- Prevents mistakes during generation of the system
- Allows an automatic build every night which checks automatically any build and compile errors on a daily basis
- We know the day after if something is broken in the source code and can start fix activities immediately
- Possibility to introduce automatic systems checks which extend the automatic testing also to the functionality itself
- Because tool itself is encapsulated with script files an adaption to new compile tools is easily and quickly possible without changing the Nightly Build Tool

# Nightly Build Tool - Screen shots (1)

MaTE\_V11\_1\_sandbox\_newNB - Nightly Build

File Association-List New Job Help

Execution Sandbox Build Test Setup

Created Sandboxes

| # | Project | Sandbox                     | Label                        | Development Path             | Resync | Drop | Del. non M. | Label Comp. |
|---|---------|-----------------------------|------------------------------|------------------------------|--------|------|-------------|-------------|
| 1 | MaTE    | d:\a2_gen_v11.1 (new)       | 2012_07_02_MaTE_R11_1_VAR... | 2012_07_02_MaTE_R11_1_VAR... | yes    | yes  | no          | yes         |
| 2 | Tests   | d:\tss_qa_generated_act ... | mainline_Tip_Revision        | mainline                     | no     | yes  | no          | no          |

Sandbox

Project: MaTE

Development Path: 2012\_07\_02\_MaTE\_R11\_1\_VARIANT (1.85.1.39)

Label: 2012\_07\_02\_MaTE\_R11\_1\_VARIANT\_Tip\_Revision

Sandbox Location

Existing Sandbox  New Sandbox

Path: Path: d:\a2\_gen\_v11.1

Additional Options

Resynchronize Sandbox  Delete non Sandbox Members  Write Component-Label  Drop Sandbox after all Jobs

## Nightly Build Tool - Screen shots (2)

MaTE\_V11\_1\_sandbox\_newNB - Nightly Build

File Association-List New Job Help

Execution Sandbox Build Test Setup

Created Builds

| # | Project | Sandbox               | Batch File                               | Parameter | Result File    | Output Files   | Abort  |
|---|---------|-----------------------|--|-----------|----------------|----------------|--------|
| 1 | MaTE    | d:\a2_gen_v11.1 (new) | WinSymbol   A2k_SymbolLink   Sym         | NB        | no Result File | no Output File | errors |
| 2 | MaTE    | d:\a2_gen_v11.1 (new) | SymLink   MaTE_SymbolLink   Symbol       | NB        | no Result File | no Output File | errors |
| 3 | MaTE    | d:\a2_gen_v11.1 (new) | WindowsVxWorks   D_A2k_All   D_A2k_Clean | NB        | no Result File | no Output File | errors |
| 4 | MaTE    | d:\a2_gen_v11.1 (new) | WindowsVxWorks   D_A2k_All   D_A2k_All   | NB        | automatic      | no Output File | errors |
| 5 | MaTE    | d:\a2_gen_v11.1 (new) | WinAnalyse   D_A2k_AnalyseWin   Win      | NB        | automatic      | no Output File | errors |
| 6 | MaTE    | d:\a2_gen_v11.1 (new) | win   DACFF   clean                      | NB        | no Result File | no Output File | errors |
| 7 | MaTE    | d:\a2_gen_v11.1 (new) | win   Trace2RDF Converter   clean        | NB        | no Result File | no Output File | errors |
| 8 | MaTE    | d:\a2_gen_v11.1 (new) | win   DACFF   release                    | NB        | automatic      | no Output File | errors |
| 9 | MaTE    | d:\a2_gen_v11.1 (new) | win   Trace2RDF Converter   release      | NB        | automatic      | no Output File | errors |

Build Options

Project: MaTE Sandbox: d:\a2\_gen\_v11.1 (new) Batch File: WindowsVxWorks | D\_A2k\_All | D\_A2k\_All

Parameter: NB Result File: automatic Output File: no Output File

Abort: errors Send Mail: errors Job Name:

Apply Changes Remove Build Clear Add Build

# Nightly Build Tool - Screen shots (3)

MaTE\_V11\_1\_sandbox\_newNB - Nightly Build

File Association-List New Job Help

Execution Sandbox Build Test Setup

Created Tests

| # | Project | Sandbox                     | Batch File                      | Parameter | Result File    | Output Files   | Abort | Send Mail | Job |
|---|---------|-----------------------------|---------------------------------|-----------|----------------|----------------|-------|-----------|-----|
| 1 | Tests   | d:\tss_qa_generated_act ... | SymLink   SymLink               |           | no Result File | no Output File | no    | errors    |     |
| 2 | Tests   | d:\tss_qa_generated_act ... | D_MaTE_SimpleTest   cleanUWA    |           | no Result File | no Output File | no    | errors    |     |
| 3 | Tests   | d:\tss_qa_generated_act ... | D_MaTE_SimpleTest   FSS_Ser...  |           | no Result File | no Output File | no    | errors    |     |
| 4 | Tests   | d:\tss_qa_generated_act ... | D_MaTE_SimpleTest   Desktop...  |           | automatic      | no Output File | no    | errors    |     |
| 5 | Tests   | d:\tss_qa_generated_act ... | D_MaTE_SimpleTest   Desktop...  |           | automatic      | no Output File | no    | errors    |     |
| 6 | Tests   | d:\tss_qa_generated_act ... | D_MaTE_SimpleTest   Desktop...  |           | automatic      | no Output File | no    | errors    |     |
| 7 | Tests   | d:\tss_qa_generated_act ... | D_MaTE_SimpleTest   BusTrace... |           | automatic      | no Output File | no    | errors    |     |
| 8 | Tests   | d:\tss_qa_generated_act ... | D_MaTE_SimpleTest   FSS_Ser...  |           | no Result File | no Output File | no    | errors    |     |

Test Options

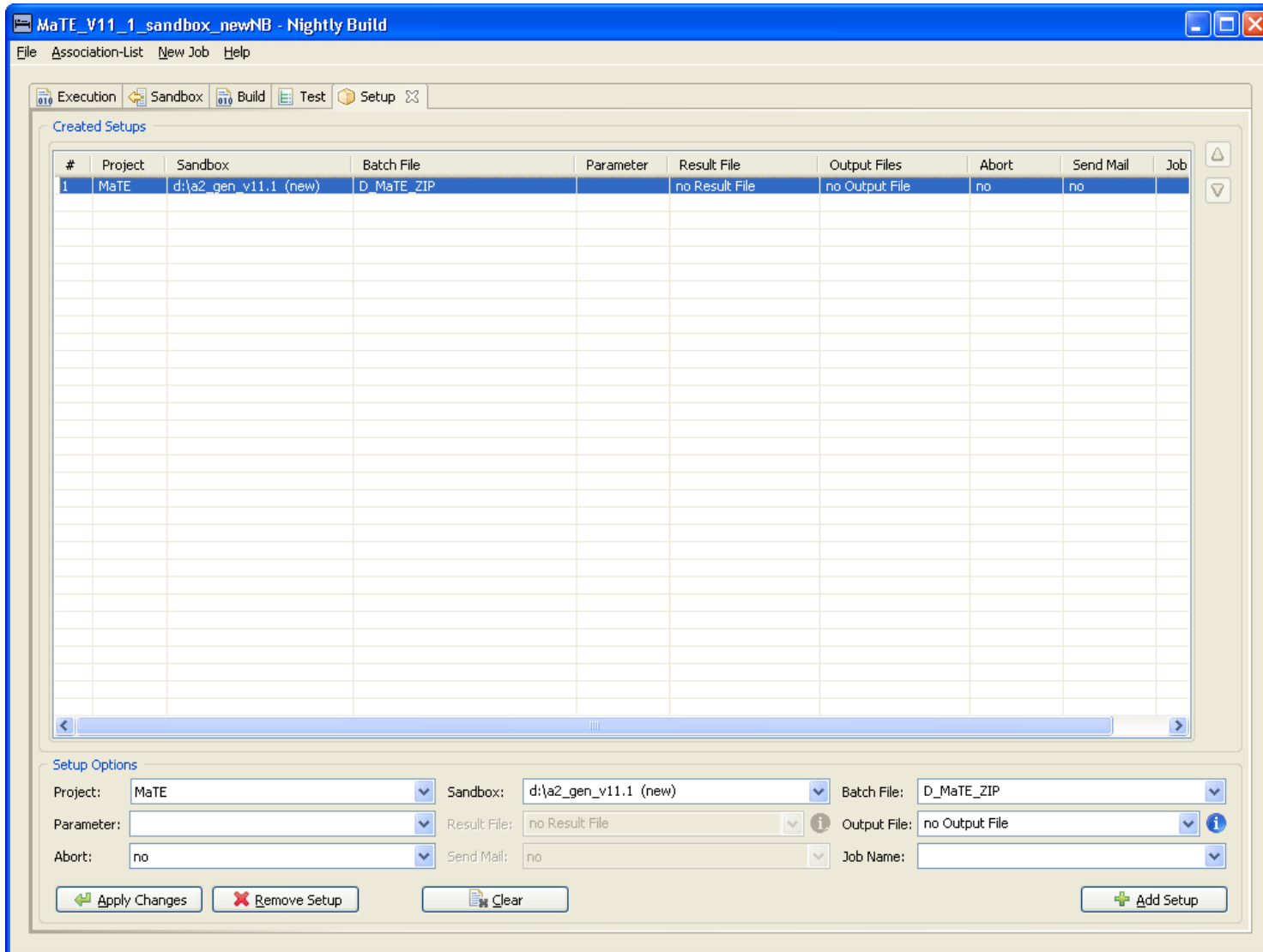
Project: Tests Sandbox: d:\tss\_qa\_generated\_act (new) Batch File: D\_MaTE\_SimpleTest | DesktopTest1

Parameter: Result File: automatic Output File: no Output File

Abort: no Send Mail: errors Job Name:

Apply Changes Remove Test Clear Add Test

## Nightly Build Tool - Screen shots (4)



The screenshot displays the 'MaTE V11\_1\_sandbox\_newNB - Nightly Build' application window. The window title bar includes standard Windows window controls (minimize, maximize, close). The menu bar contains 'File', 'Association-List', 'New Job', and 'Help'. The toolbar includes icons for 'Execution', 'Sandbox', 'Build', 'Test', and 'Setup'. The main area is titled 'Created Setups' and contains a table with the following data:

| # | Project | Sandbox               | Batch File | Parameter | Result File    | Output Files   | Abort | Send Mail | Job |
|---|---------|-----------------------|------------|-----------|----------------|----------------|-------|-----------|-----|
| 1 | MaTE    | d:\a2_gen_v11.1 (new) | D_MaTE_ZIP |           | no Result File | no Output File | no    | no        |     |

Below the table is a 'Setup Options' section with the following fields:

- Project: MaTE
- Sandbox: d:\a2\_gen\_v11.1 (new)
- Batch File: D\_MaTE\_ZIP
- Parameter: (empty)
- Result File: no Result File
- Output File: no Output File
- Abort: no
- Send Mail: no
- Job Name: (empty)

At the bottom of the window are four buttons: 'Apply Changes', 'Remove Setup', 'Clear', and 'Add Setup'.

# Nightly Build Tool - Screen shots (5)

The screenshot displays the MaTE V11.1 Nightly Build tool interface. The main window is titled "MaTE\_V11\_1\_sandbox\_newNB - Nightly Build". The interface is divided into several panels:

- Execution:** Contains buttons for "Run Bundle" and "Stop Bundle".
- Job-Bundle:** Shows a tree view of the build jobs: MKSJob, BuildJob, TestJob, and SetupJob.
- Job-Details:** A table listing individual jobs and their error/warning counts.
 

| Job        | Errors/Warnings |
|------------|-----------------|
| MKSJob 1   |                 |
| MKSJob 2   |                 |
| BuildJob 1 |                 |
| BuildJob 2 |                 |
| BuildJob 3 |                 |
| BuildJob 4 | 8 warnings      |
| BuildJob 5 | 54 warnings     |
| BuildJob 6 |                 |
| BuildJob 7 |                 |
| BuildJob 8 | 1 warnings      |
| BuildJob 9 | 4 warnings      |
| TestJob 1  |                 |
| TestJob 2  |                 |
| TestJob 3  |                 |
| TestJob 4  |                 |
| TestJob 5  |                 |
| TestJob 6  | 1 errors        |
| TestJob 7  |                 |
| TestJob 8  |                 |
| SetupJob 1 |                 |
- Result & Output Files:** Shows "LogMaTE\_Release.xml".
- Mail Options:** Includes checkboxes for "Send mail to responsible people" and "Send mail to: Andreas.Weit@cassidian.com".
- Job-Bundle Name:** DemoRun
- Logger:** A large window displaying a detailed log of build activities. The log includes columns for Time, Type, Location, and Message. The messages show the compression of various files and the successful completion of the build process.

# Nightly Build Tool - Screen shots (6)

NB: [1 errors/67 warnings] DemoRun - Message (Plain Text)

Message

Reply Reply Forward Delete Move to Create Rule Other Actions Block Sender Not Junk Categorize Follow Mark as Related Select Find

This message was sent with High importance.

From: MKS-Info@cassidian.com  
 To: Weitl, Andreas  
 Cc:  
 Subject: NB: [1 errors/67 warnings] DemoRun

Message MaTE\_V11\_1\_sandbox\_newNB\_20130916\_131420.zip (37 KB)

[This mail was automatically generated by the Nightly-Build-System. Please do not rep]

Job-Bundle: MaTE\_V11\_1\_sandbox\_newNB  
 5 Jobs with errors or warnings:

BuildJob 4:  
 D:\A2k\Software\Create\_MaTE\_Release.bat  
 0 errors/8 warnings

BuildJob 5:  
 D:\A2k\Software\WinDummy.bat  
 0 errors/54 warnings

BuildJob 8:  
 Software\Win\_DACFF\_Release.bat  
 0 errors/1 warnings

BuildJob 9:  
 Software\Win\_RDF2Trace\_Release.bat  
 0 errors/4 warnings

TestJob 5:  
 D:\MaTE\uwas\uwaATP\_simpleBuses\StartDesktopTest2.bat  
 1 errors/0 warnings

Build Result

Total

Project: Windows Mate Subproject amount: 206  
 Type: Release Warnings: 54  
 Start Time: Mon Sep 16 13:53:55 CEST 2013 Errors: 0  
 Duration: 00:53:45

Subprojects

Show  
 Warnings  Errors  OK

| Name                              | Warnings | Errors |
|-----------------------------------|----------|--------|
| SF_InterfaceEvents_ControlServer  | 0        | 0      |
| SF_InterfaceEvents_ControlUI      | 0        | 0      |
| IT_Definitions                    | 0        | 0      |
| ICU_GENERIC_Messages              | 0        | 0      |
| ICU_AFDX_Messages                 | 0        | 0      |
| SF_InterfaceTracer_ControlServer  | 1        | 0      |
| SF_InterfaceTracer_ControlUI      | 0        | 0      |
| SF_StatusDisplay_Stana93910Server | 0        | 0      |
| SF_StatusDisplay_Stana93910UI     | 1        | 0      |
| STM_Main                          | 3        | 0      |
| TM_ControlUI                      | 0        | 0      |
| UX_Services                       | 0        | 0      |
| IC_DictionaryUI                   | 0        | 0      |
| RR_DictionaryServer               | 0        | 0      |
| RR_DictionaryUI                   | 0        | 0      |
| BT_DictionaryUI                   | 0        | 0      |
| TM_ControlEnvironment             | 1        | 0      |
| SVC_DictionaryServer              | 0        | 0      |

Output

LINK : warning LNK4089: all references to "MFC42.DLL" discarded by /OPT:REF  
 LINK : warning LNK4089: all references to "SHLWAPI.dll" discarded by /OPT:REF  
 LINK : warning LNK4089: all references to "USER32.dll" discarded by /OPT:REF

Close

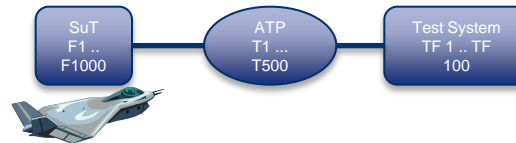


## Next steps

- ✓ Automated Self Tests; we call it „Auto TPs“
- ✓ Unattended run
- ✓ Failsafe system
- ✓ Add tests to source control
- ✓ Include automated tests in the Nightly Build tool
- Add model based tests in the Nightly Build tool, which run automated
- ✓ Change Nightly Build tool to run without source control connection

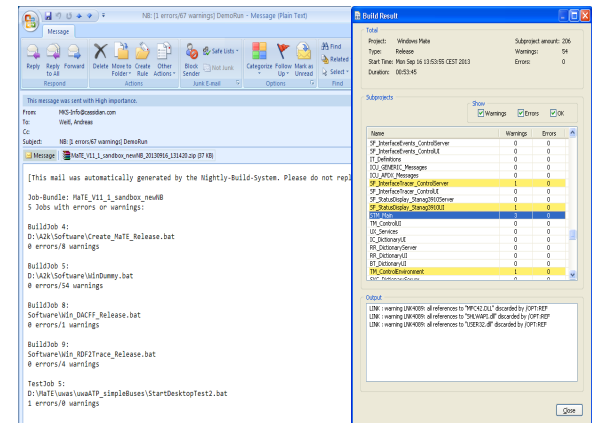
# Conclusion

- Increased number of features → workload for version creation and validation increased



- Connection of build and test → increased effectiveness → keeps workload in acceptable borders
- Automatic report → affected developers → faster response

- Increased quality → less problem reports
- Higher customer satisfaction



Thank you for your attention!

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