

30 years of traceability from A320 to A350

Presented by
Patrick FARAIL Airbus Operations SAS – EADS expert on Software engineering

Avionics & Simulation Products

- Hardware & software aviation equipment
- DO-178 / ED-12
- Research simulators
- Components for training & flying simulators
- Some ground applications
- Technological & methodological expertise
- More than 400 developers



A340WBI : Before New tool, New methodology

First : to define a requirement engineering method **based on requirements** identification
Strong Cultural change

- spend time to work on requirement identification in specification activity
20% specification effort in addition
What is the right level of granularity
- new design method : based on model – HOOD
what is requirement in design model ? => Software components

Second : prototyping tool to **help team on requirement traceability**

A340WBI : Before New tool, New methodology

4.4.2.SPÉCIFICATION LOGICIELLE DU SOUS PROCESSUS "PREPARER SORTIE SUR IT"

4.4.2.1.Interfaces

Voir DFD/DFC 2.0.3

E_SLSAUTO_SLSAUTO_INTERFACE_3.2_2810

4.4.2.2.Spécification du processus

4.4.2.2.1. Présentation

Ce processus est chargé d'effectuer les traitement spécifiques effectués en cas de sortie des autotests sur IT (autre que NML ALIM).

4.4.2.2.2. Exigences logicielles

Les traitements à effectuer sont:

- arrêter les timers
- arrêter les DSP
- Incrémenter l'indice de la dernière panne de la shop-zone
- écrire dans la shop-zone l'identifiant du service interrompu
- sauvegarder les informations associées à la panne courante dans la shop-zone
- déterminer le contenu de la variable RESULTAT_AUTOTESTS
- mettre à jour l'EEPROM à partir de son image RAM.

E_SDLF_SLSAUTO_SORTIE_IT_2830

cf. E_SDLF_SLSFCPC_AUTO_2555

- écrire en EEPROM la variable RESULTAT_AUTOTESTS: après une attente de 10 ms, si la donnée n'a pas été correctement écrite en EEPROM cela signifie que l'EEPROM n'est pas fiable. Il y a donc un risque pour que le logiciel système interprète mal le résultat des autotests. Afin de se prémunir d'un mauvais comportement, le calculateur doit être arrêté (cf §7.3. page 112).

E_SLSFCPC_SLSAUTO_RES_AUTO_IT_2820

cf. E_SLSFCPC_SLSFCPC_ApresAutotests_AUTO_5319

cf. E_SLSFCPC_SLSFCPC_ApresAutotests_AUTO_5320

cf. E_SLSFCPC_SLSFCPC_ResultatAutotests_AUTO_6230

cf. E_STI_SLSFCPC_AUTO_780

cf. E_STI_SLSFCPC_AUTO_625

cf. E_SLSFCPC_SLSFCPC_ApresAutotests_AUTO_5340

COMPONENT ENTREE_DISCRETE IS

25.1. PRAGMAS

PRAGMA comment

25.2. MNEMONIQUE

AED

25.3. DESCRIPTION DE LA MACHINE

Commentaire des actions réalisées par la machine

25.4. RÉFÉRENCES AUX DOCUMENTS DE SPÉCIFICATION

Cf. E_SLSAUTO_SLSAUTO_INTERFACE_3.2_2810

cf.E_ACEM_SLS_DiscretIn_00010

cf.E_ACEM_SLS_DiscretIn_00020

cf.E_ACEM_SLS_EmisCycDiscret_00010

cf.E_ACEM_SLS_AcqCycl_00030

cf.E_ACEM_SLS_PhysLog_00010

cf.E_ACEM_SLS_ModeOpCalc_00010

cf.E_ACEM_SLS_ModeOpCalc_00020

cf.E_ACEM_SLS_ModeOpCalc_00030

25.5. EXIGENCES DÉRIVÉES DE CONCEPTION

Sans Objet

25.6. DESCRIPTION DE LA SOLUTION

Pour gérer l'acquisition et l'émission cyclique des discrets, la machine s'appuie sur 2 services :

- Un service d'initialisation des ressources de la machine (AED_Se_Initialiser).
- Un service d'acquisition des discrets qui réalise l'accès au driver, gère la cadence d'acquisition/émission, fournit l'état des discrets aux applications (AED_Se_AcquerirDiscret) et formate les discrets sur des labels arinc pour émission.

25.7. JUSTIFICATION DES DÉCISIONS DE CONCEPTION

Cette machine regroupe les actions réalisées sur les entrées discrètes.

25.8. INTERFACE EXPORTÉE

25.8.1. SERVICES

25.8.1.1. Service AED_Se_Initialiser

25.8.1.1.1. description textuelle

Ce service a pour but d'initialiser les ressources de la machine lors d'un démarrage ou d'un redémarrage.

Le type de démarrage est récupéré en paramètre.



Automatic traceability matrix
Always consistent
Provides Impact analysis

Ouate prototype : Outils d'Aide à la Traçabilité des Exigences

A340WBI : Before New tool, New methodology

Very good feedback

- communication with client
- maturation of specification
- We need a tool

but some enhancements to improve method
and to develop more efficient tool

- requirement Granularity for design : Service/Function
- new necessary information associated to HLR : Requirement data Structure
- Enhance the tooling to use traceability not only for certification concern but to use it for project management and study impact.

Which Tool ?????? In 2000

The same kind of deployed tool in industries ... Data Base oriented

⇒ large Benchmark with several DOORS Users

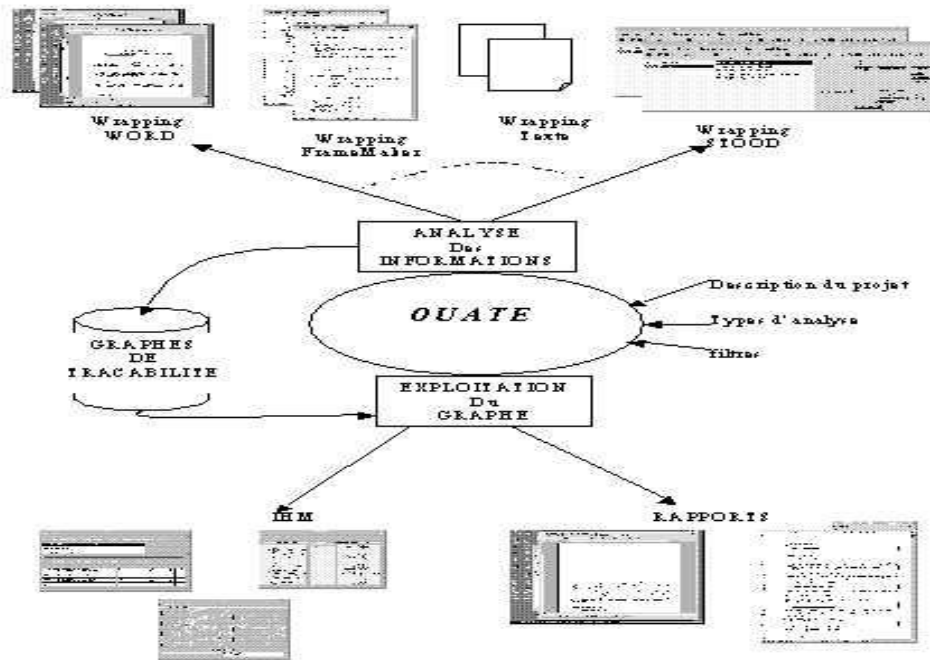
Assumptions :

- No modification on transversal process : Configuration and change management
- No perturbation on overall process : Requirement Engineering is already a strong step
- Requirement Engineering is completely deployed in development team : Specification, design, verification, coding.

⇒ **Go to a light-weight tool**
create a new solution in the market (not only for Airbus)

Drivers for Reqtify

- ✓ A large number of product from all development activities : several tens of products, each one may contain several hundred of pages.
- ✓ Diversity of tools : document oriented, spreadsheet, models, code, test tool
- ...
- ✓ Using tool in interactive mode, in batch mode
- ✓ Define and Generate highly customized reports

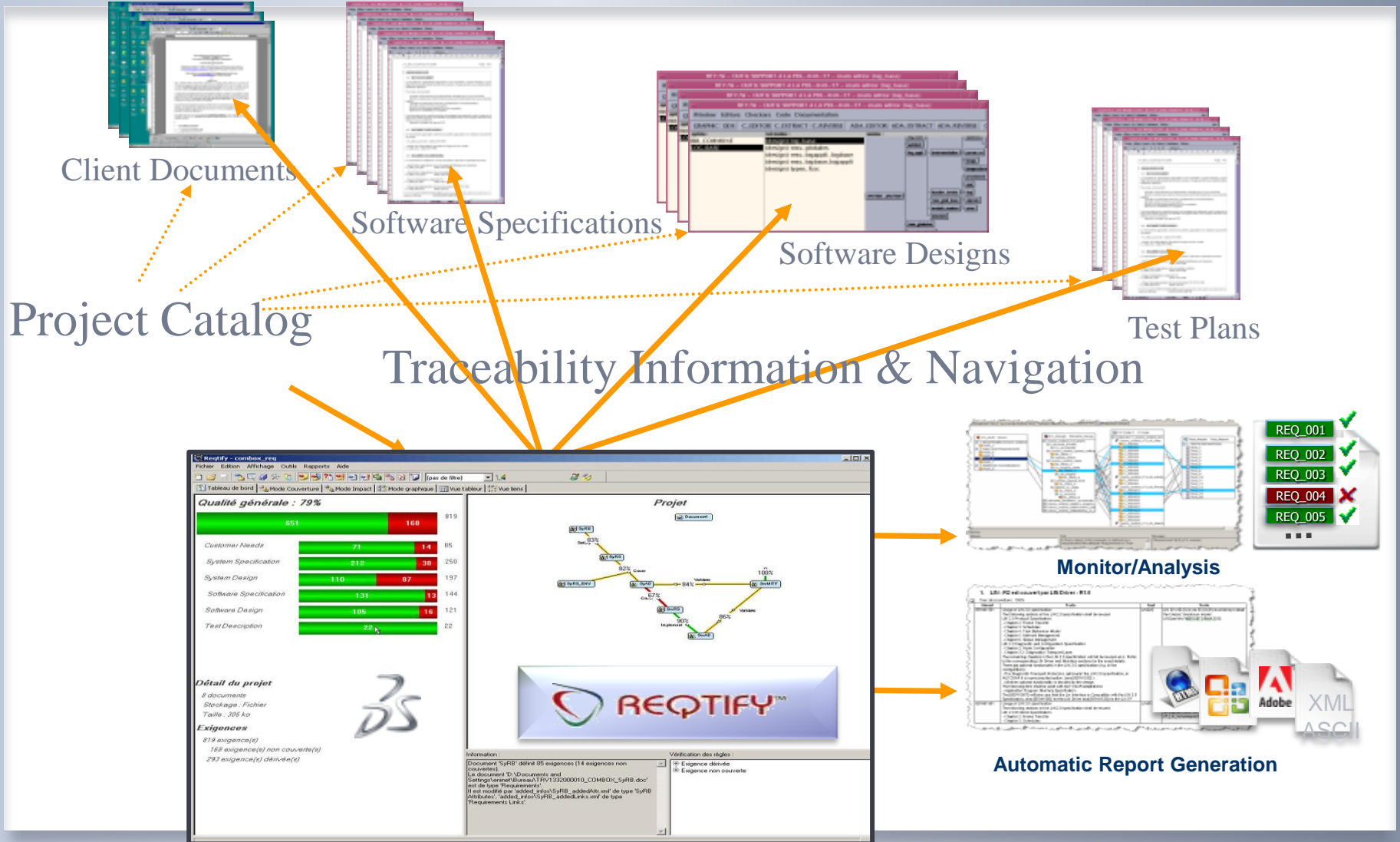


A380 and A350 usage in Airbus 2001 - 2011

- For all software development : constrained by DO178B (Embedded software or development tools), or not (tools, simulation software)...
- For all hardware development : constrained by DO254
- At equipment level : for avionics computer or simulation environment
- At system level to establish traceability between detailed design models and high level requirement
- For software development in IS context

This usage represents ~500 users in extended enterprise
Tool functions and customization (reports, catalog, filters) are qualified as
verification tool in DO178B sense (avoid to test the tool results)

A380 and A350 usage in Airbus 2001 - 2011



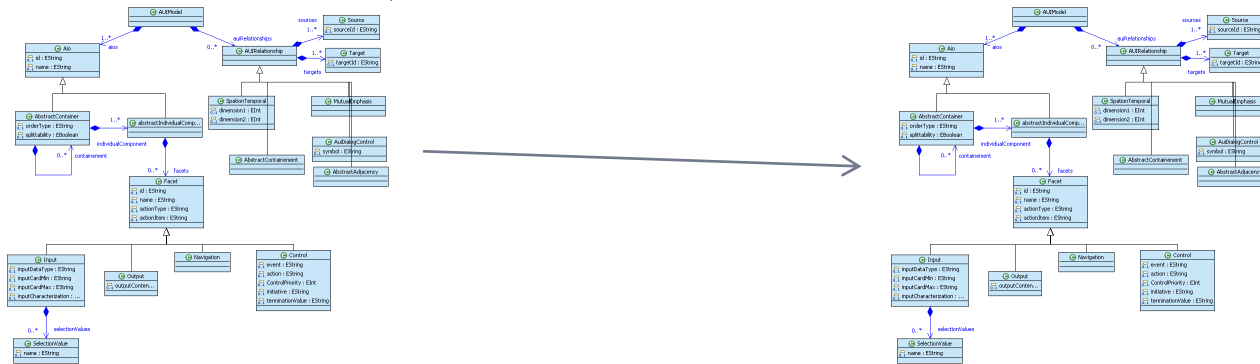
Perspectives : Vision 2015

A new cultural change Model Based Engineering

Requirements are formalized through models

We need tools to manage these requirements in models :
functionalities of CASE Tools

We need tools to manage traceability between several models





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