WELCOME

Alcatel-Lucent Enterprise
Model Based Testing applied to Video Testing

Michel SUHR
ETSI MBT User Conference – *Berlin October 18-20 2011*
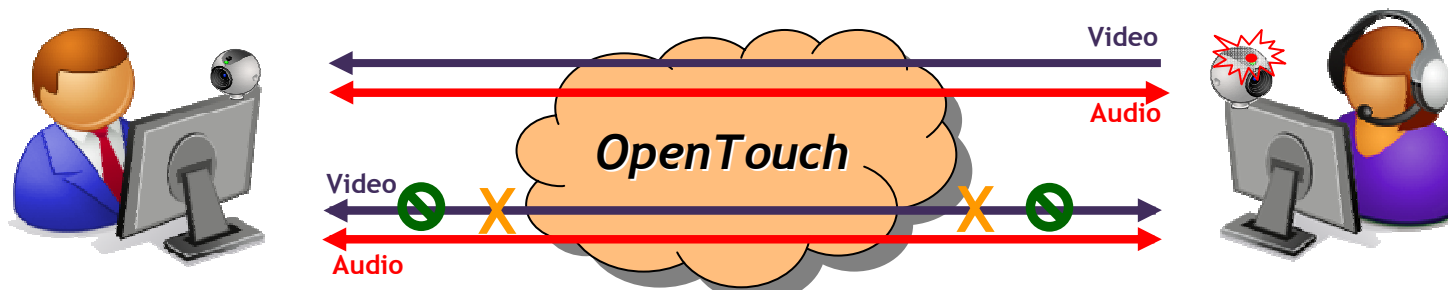
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AGENDA

1. Modeled Use Case description

2. Implemented tool chain

3. User oriented modeling approach

4. Model Extract

5. Test generation using pairwise testing

6. Automation strategy

7. Results and perspectives

8. Questions and answers session

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Alcatel-Lucent myIC Video use case on OpenTouch™
## *My Instant Communicator Use Case description*

Two users want to connect with next generation resources : audio and video. Both users own a Unified Communication Application (a.k.a. myIC) with the video feature enabled. They are identified as "local" and "distant".

- Both myIC users (local and distant) can do a call to the other user, with or without video

- Both of them can accept the call with the video or only in audio

- In video call established, both users can: mute, play or drop the video (call becomes audio only)

- In audio-call-only established, both users can add the video

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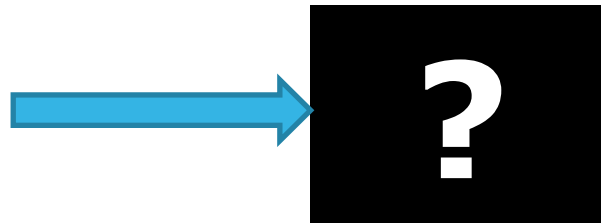## Implemented tool chain
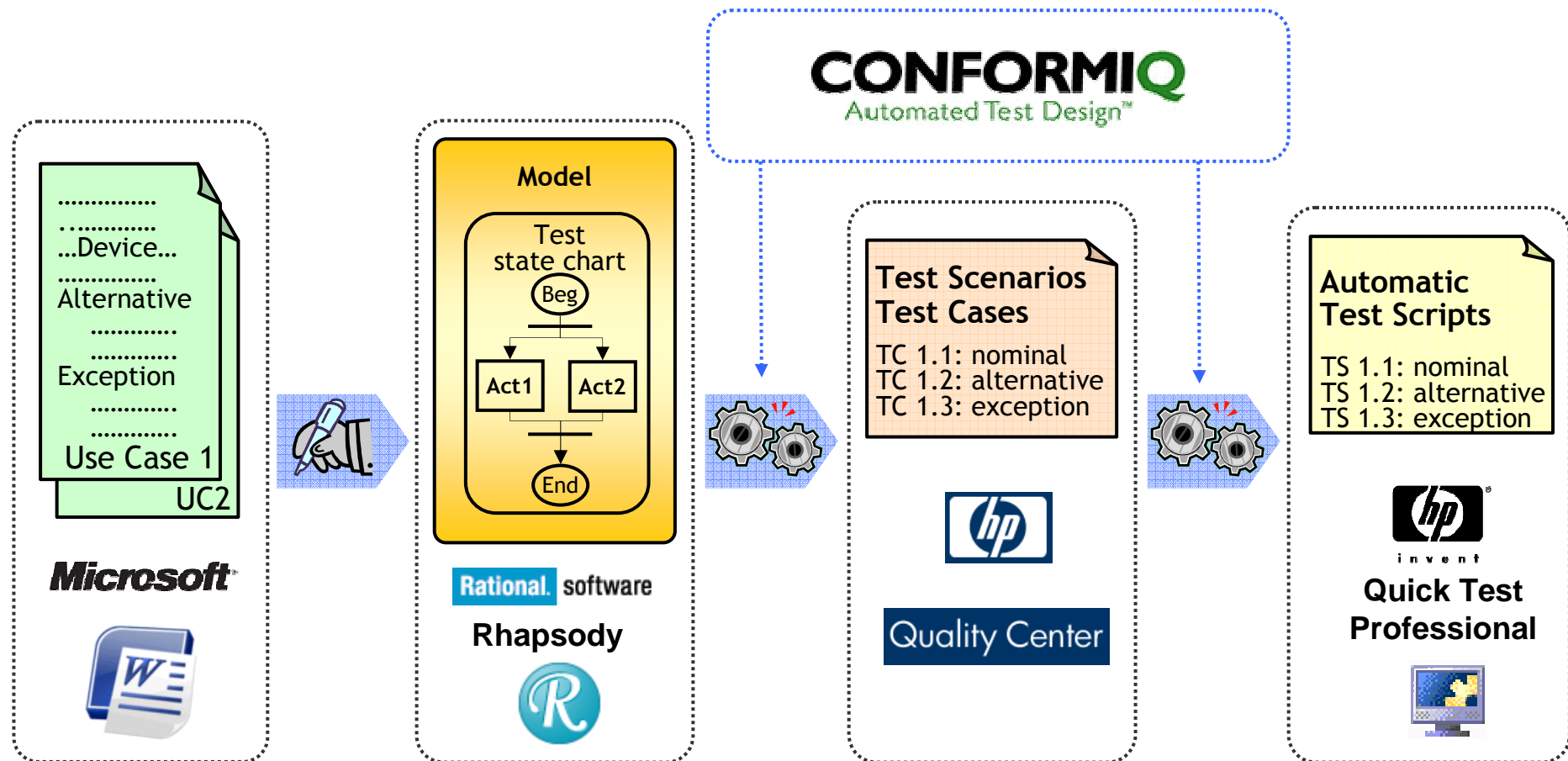
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User oriented modeling approach

- Black Box Approach : we are focusing on behavior of the system without worrying on how it works

**User1 makes video call
User2 drops the video
User1 ends the call
etc…**

?

- One single state chart for modeling this Black Box

- This use case description is easy to understand for all stakeholders (solution designers, developers, testers) of the project

- Design, development and test reviews are more efficient based on this modeling

- Customer guide can be produced from this modeling too

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User oriented modeling approach

- Black Box Approach : we are focusing on behavior of the system without worrying on how it works

?

Audio call established
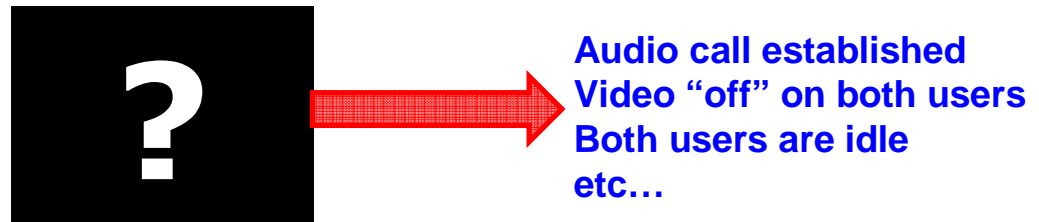**Video "off" on both users**
Both users are idle
etc…

- One single state chart for modeling this Black Box

- This use case description is easy to understand for all stakeholders (solution designers, developers, testers) of the project

- Design, development and test reviews are more efficient based on this modeling

- Customer guide can be produced from this modeling too

- Our test result is done on the output of the black box

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Model extract

Simplified

Out of Conformiq

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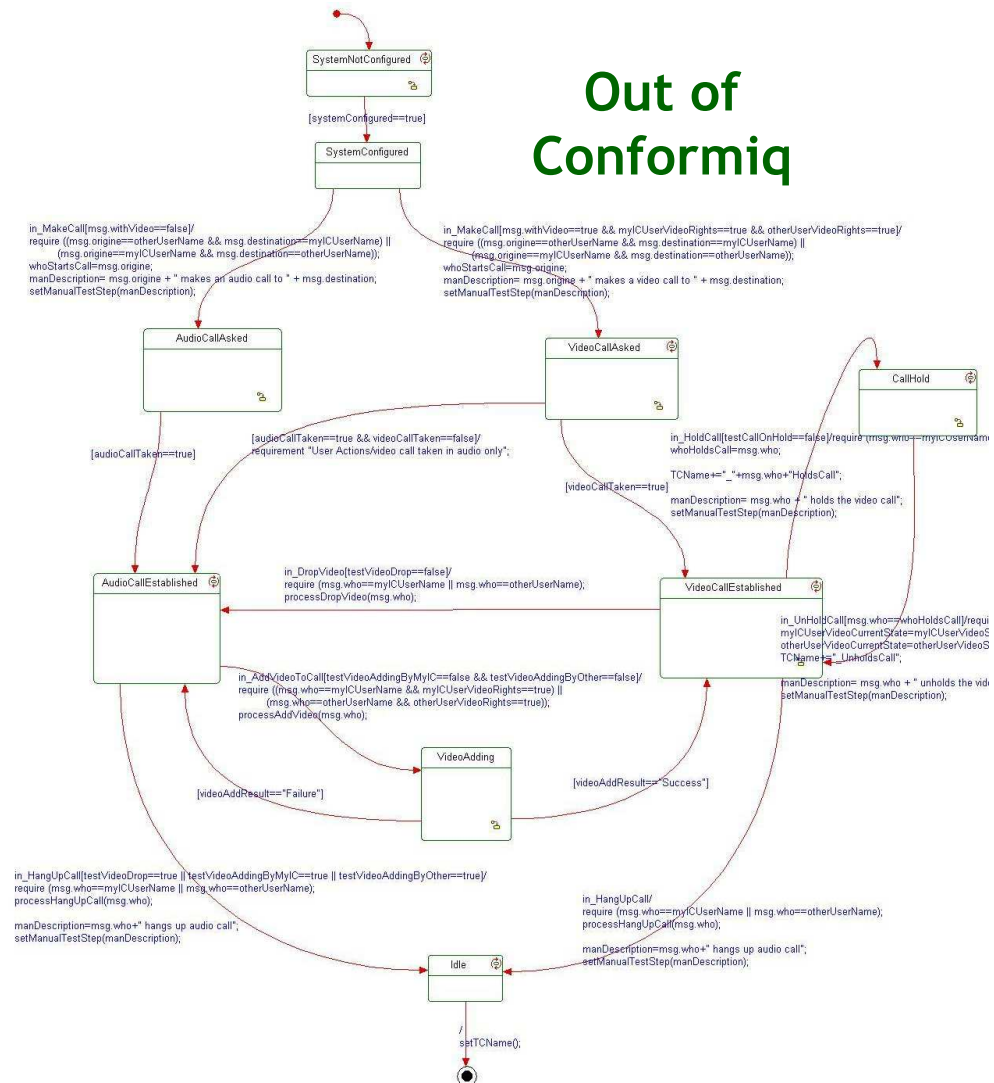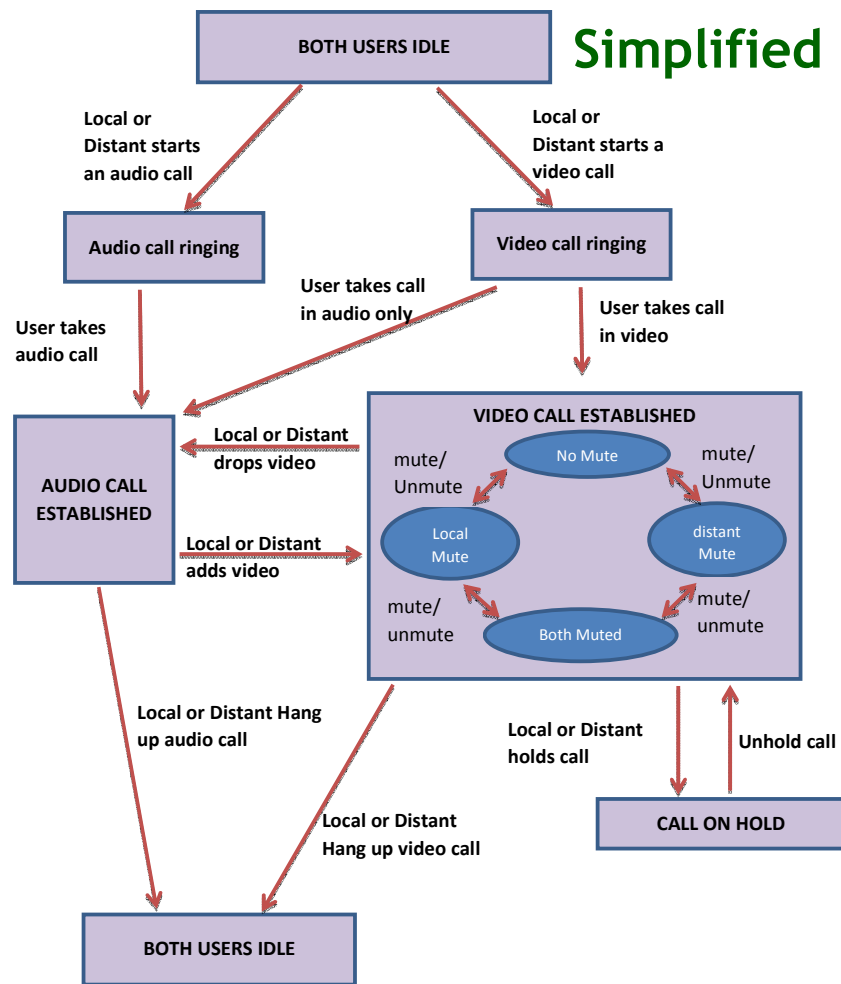
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Test generation using pairwise testing

- Pairwise (a.k.a. all-pair) generated test suites cover all combinations of two factors: very effective in finding defects

- In the same idea than modeling approach ("Use Case" vs. "System" modeling), we less care about code coverage than what end-users will do

  - E.g.: during a video call, users can drop and then add video. During an audio call, users can add video and then hold …

- Default mode generation : 20 Test Cases generated

  - Not satisfying vs. test strategy
  - No guarantee to have a test with drop then add or with add then hold …

- All States combinations : 1000 Test Cases generated

  - Really too many redundancies and impact on execution duration
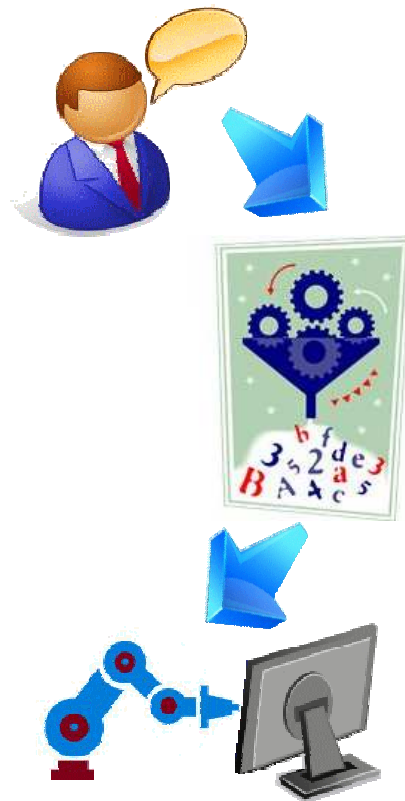
- Pairwise : 70 Test Cases generated

  - Good coverage vs. test strategy. Good compromise regarding execution duration
  - Guarantee to have a test with drop then add another with add then hold …

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Automation strategy

- Model designed for automation but without execution information
- Functional high level description applicable to any automatic test framework
- 3 layers model: from User Action to System Under Test via a Translation layer

Test Cases generated from model and exported with the MBT tool plug-in

High level view / logical representation

```
Test Case 1
in_NewCall "local","distant",true
out_UserState "local","outgoingVideoCall"
Test Case 12
in_NewCall "distant","local",false
out_UserState "local","incomingAudioCall"
```

Specific translation layer to adapt to each test environment

Concretize the logical TC by assigning real values for execution and by calling the generic test harness functions

```
in_NewCall (string from, string to, boolean withVideo)(
        if (from = "local") origin = 12345
        if (from = "distant") origin = 54321
        if (to = "local") destination = 12345
        if (to = "distant") destination = 54321
        SelectCurrentMyIC (origin)
        MyIC_NewCall (destination, withVideo))
out_UserState (string who, string state)(
        if (who = "local") userToCheck = 12345
        if (who = "distant") userToCheck = 54321
        MyIC_UserStateCheck (userToCheck , state)
```

Generic test harness for execution

Standards libraries that interoperate with the SUT (stimulation, supervision)

```
MyIC_NewCall (int destinationID, boolean video) (
        SearchContact (destinationID)
        if (video = true) LaunchVideoCall
        if (video = false) LaunchAudioCall
)
MyIC_UserStateCheck ...
SelectCurrentMyIC...
```

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Results and perspectives

- Presented case effort summary

  - Modeling and test generation: 2 men.week

  - Automation 4 men.week

    - Model vs. Scripts debug : 1 man.week

    - Test harness development (independent of MBT): 3 men.week

- Openness to future evolutions of the model

  - Addition of a third my Instant Communicator user for call evolution

    - Enquiry call, transfer

    - Conference

  - Re-use of the model for

    - future Alcatel-Lucent device supporting video

    - third party video equipment

Any question?

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Backup slides

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Pairwise testing, what is it ?

- Extract of our pairwise strategy :

  Call Type = "Audio IN" or "Audio OUT" or "Video IN" or "Video OUT"

  Video action in audio = "local adds Video" or "distant adds Video" or "Nothing"

  Hold action in video = "local holds Call" or "distant Holds call" or "Nothing"

  Video action in video = "local drops video" or "distant drops Video" or "Nothing"

- E.g. of pairs :

  - "Audio IN" and "local adds Video"

  - "Audio IN" and "distant Holds call"

  - "Video OUT" and "distant Holds call"
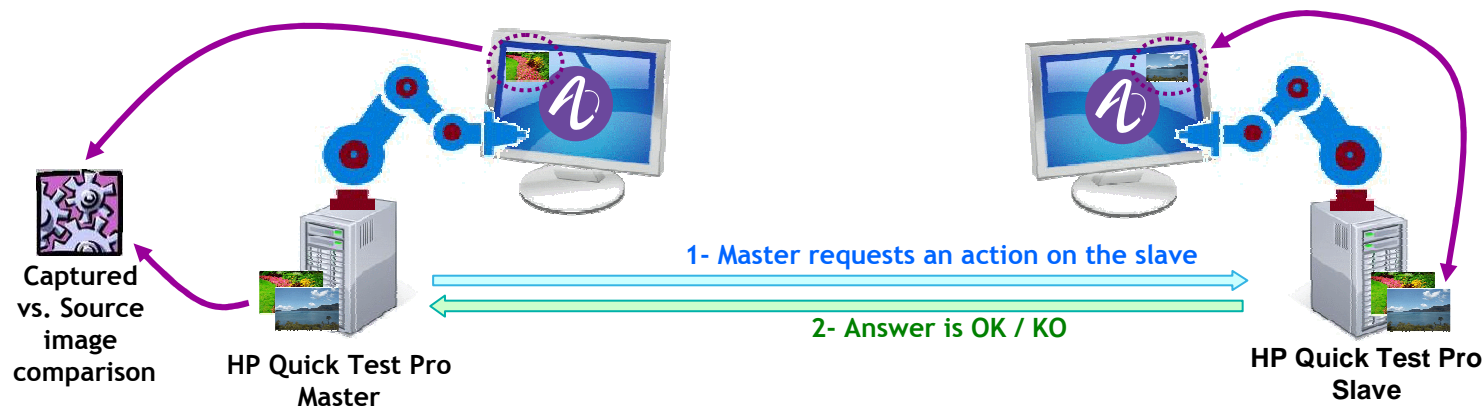
  - "local adds Video" and "distant Holds call"

- And in one test, we'll cover several pairs (6 here):

  - "Audio IN" / "local adds Video" / "distant Holds call" / "distant drops Video"

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Video automation methodology

- Functional behavior simulation
  - Two Quick Test Professional synchronized through COM sockets
  - Synchronous action request from Master to Slave
  - Local check of actions and video continuity and OK or KO answer
- Video presence and continuity check
  - Two images alternated every 5 seconds sent on the screen by a virtual webcam
  - 3 captures in a 10 seconds timeframe by Quick Test Pro
  - QTP native check bitmap function for video presence assessment

Captured vs. Source image comparison

HP Quick Test Pro Master

1- Master requests an action on the slave

2- Answer is OK / KO

HP Quick Test Pro Slave

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