



UAq EMC Laboratory



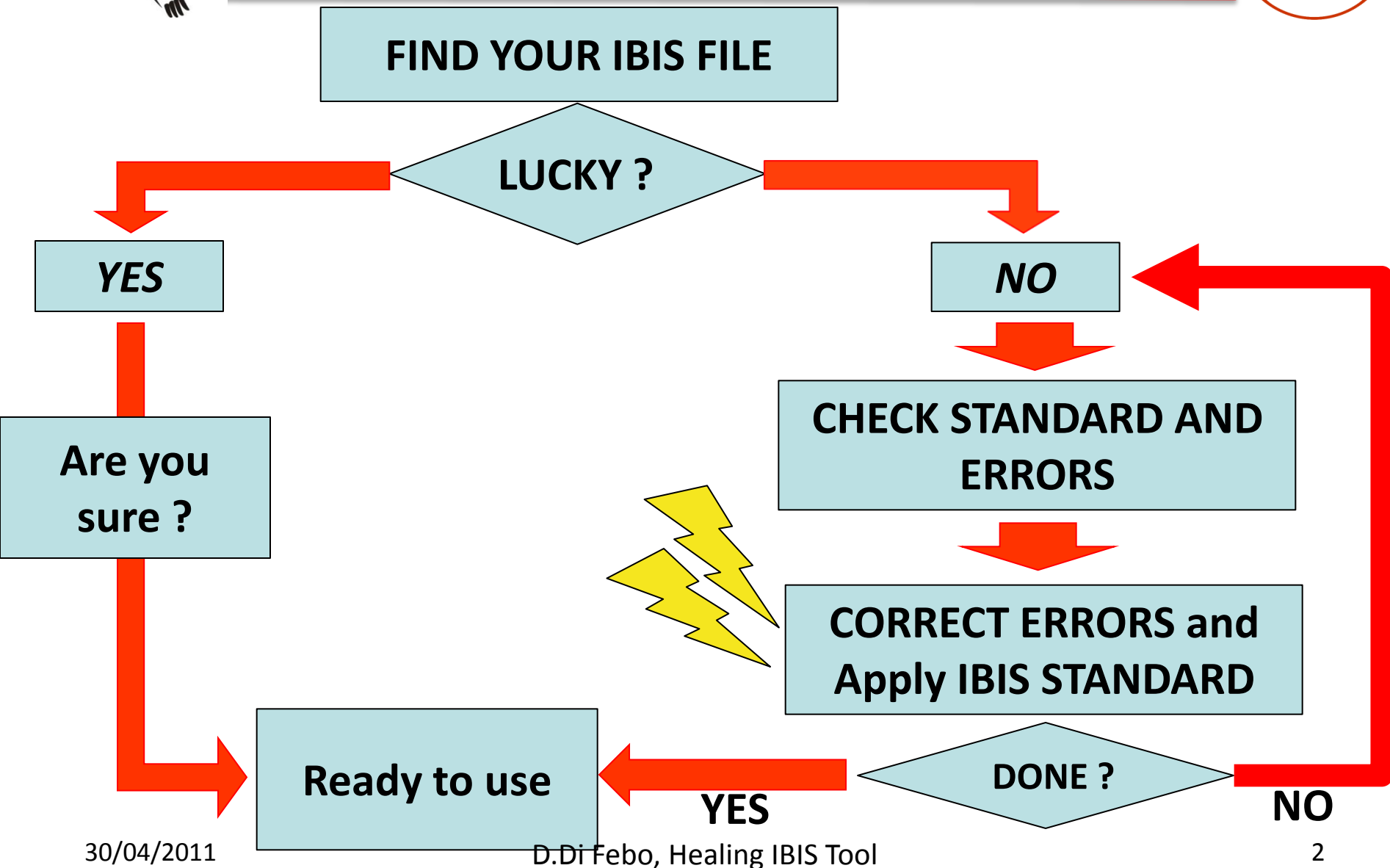
“IBIS File : Problems & Software Solution”

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***European IBIS Summit
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How to Use an IBIS Model?



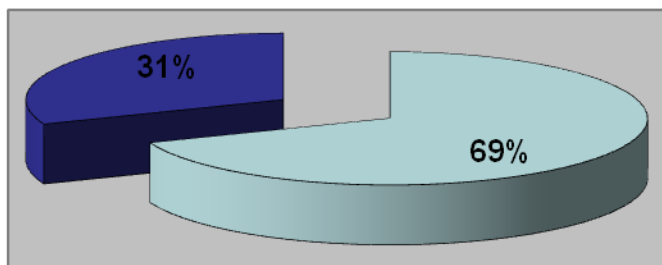


Why Healing an IBIS Model?

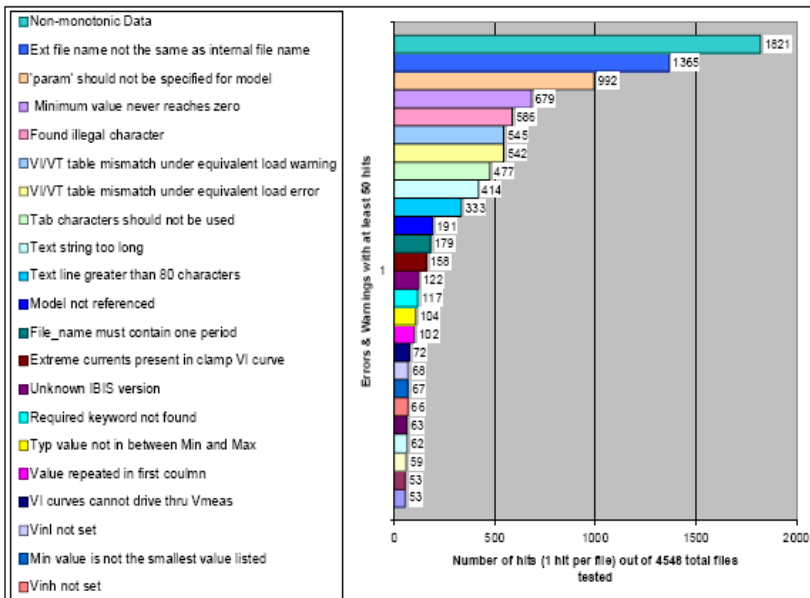


Errors on **4548 IBIS files** tested:

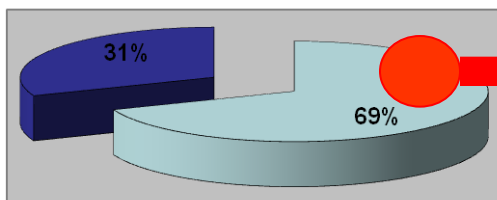
- **“Non monotonic data”** about **19.30%**
- **“File name mismatch”** about **14.68%**
- **“Parameter should not be specified for model”** about **10.51%**



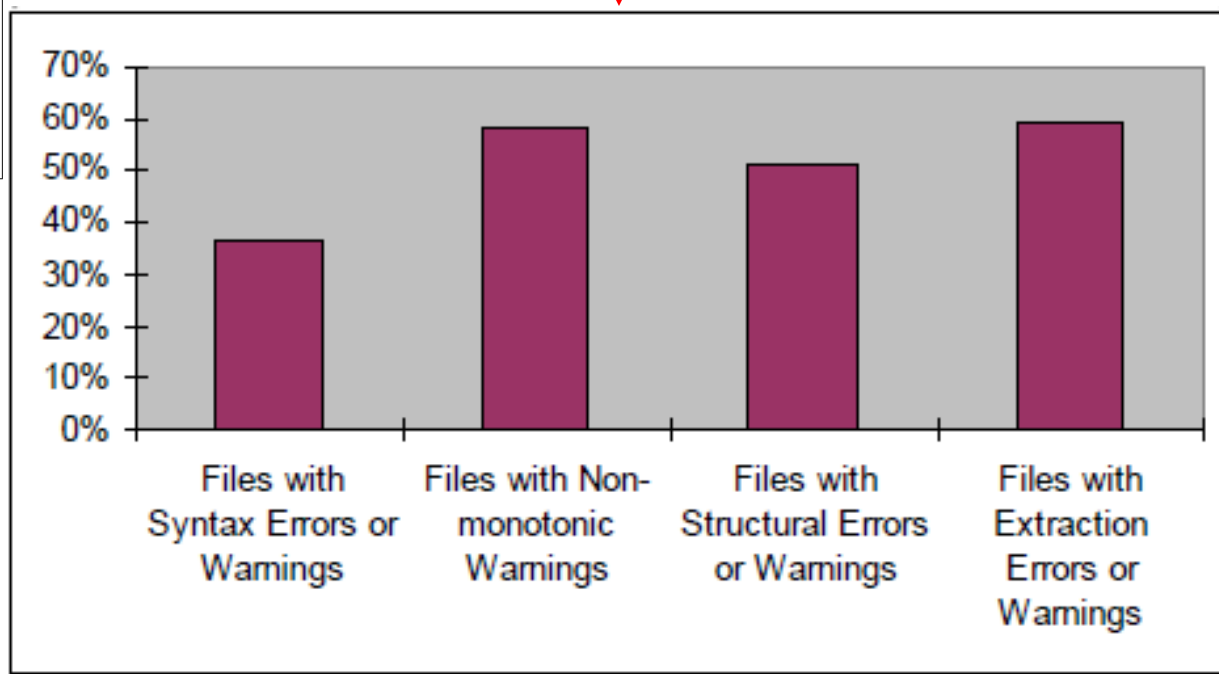
- **IBIS file with at least one significant error or warning**
- **IBIS file with no errors or warnings**



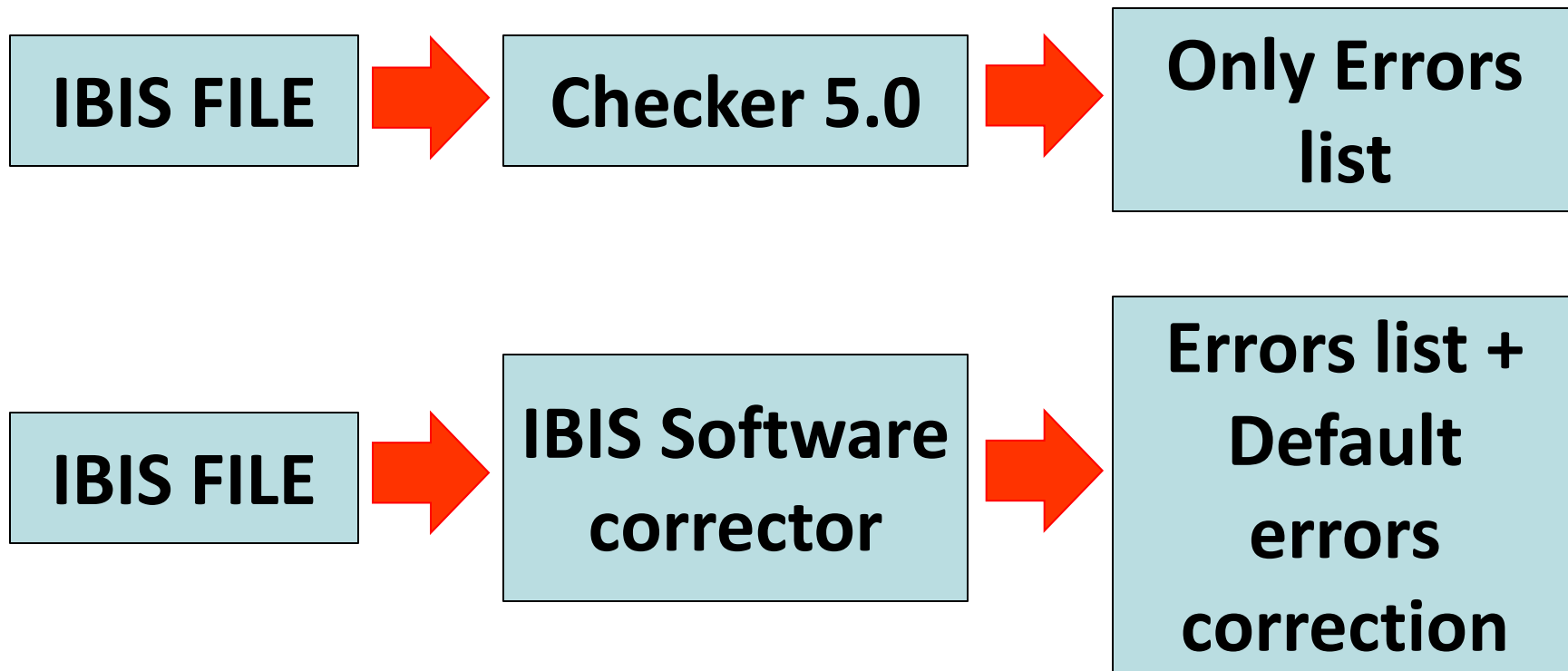
- **“Found illegal character”** about **6.21%**
- **“V-t & V-I Mismatch under equivalent load”** about **5.78%**
- **“Extreme current in V-I clamp curve”** about **1.67%;**
- **Other errors or warnings 41.85%**



- IBIS file with at least one significant error or warning
- IBIS file with no errors or warnings



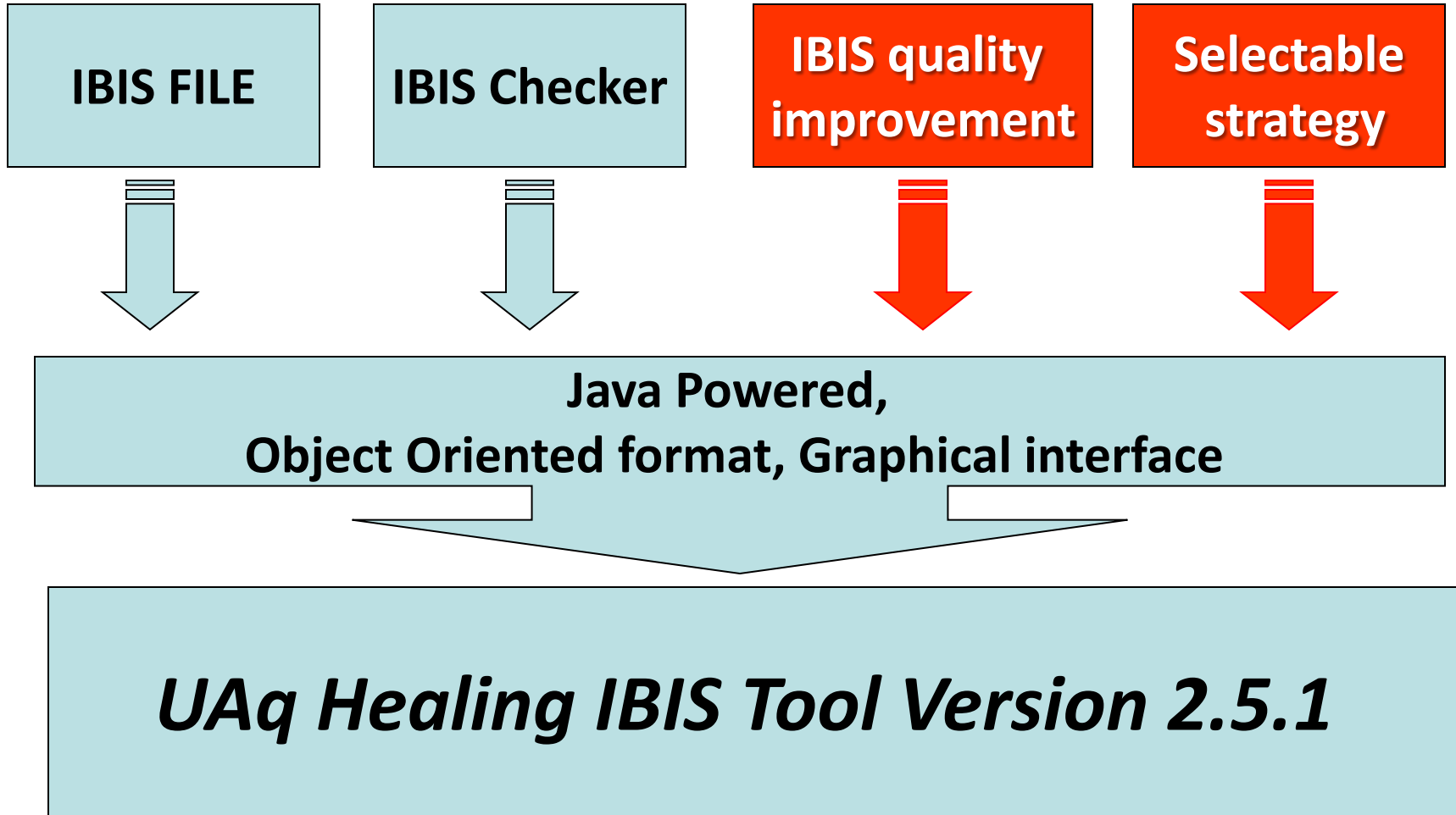
SiQualSM Technical White Paper "A Critique of IBIS Models", 2002 SiQual Inc.



AND Quality IMPROVEMENT ?

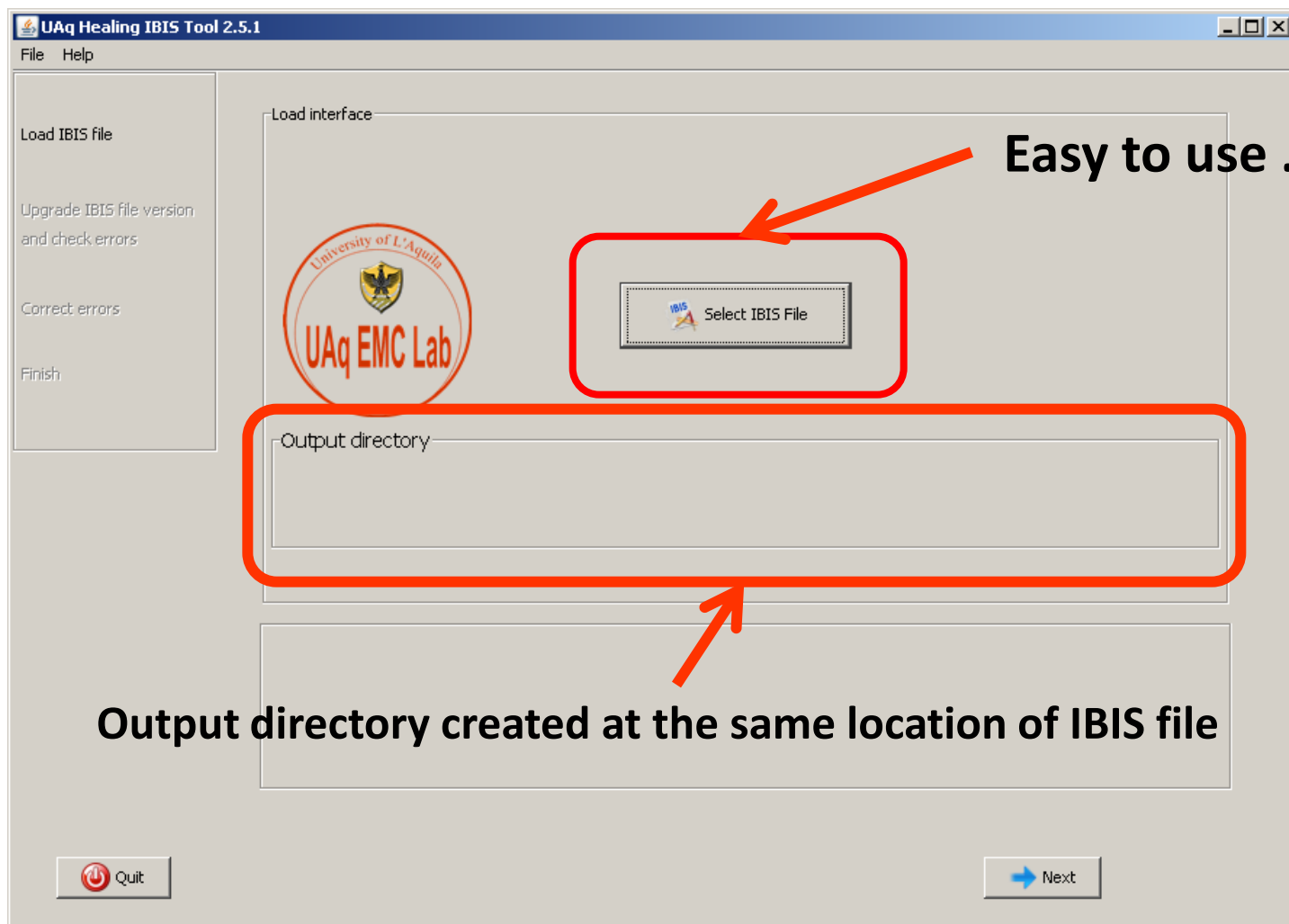


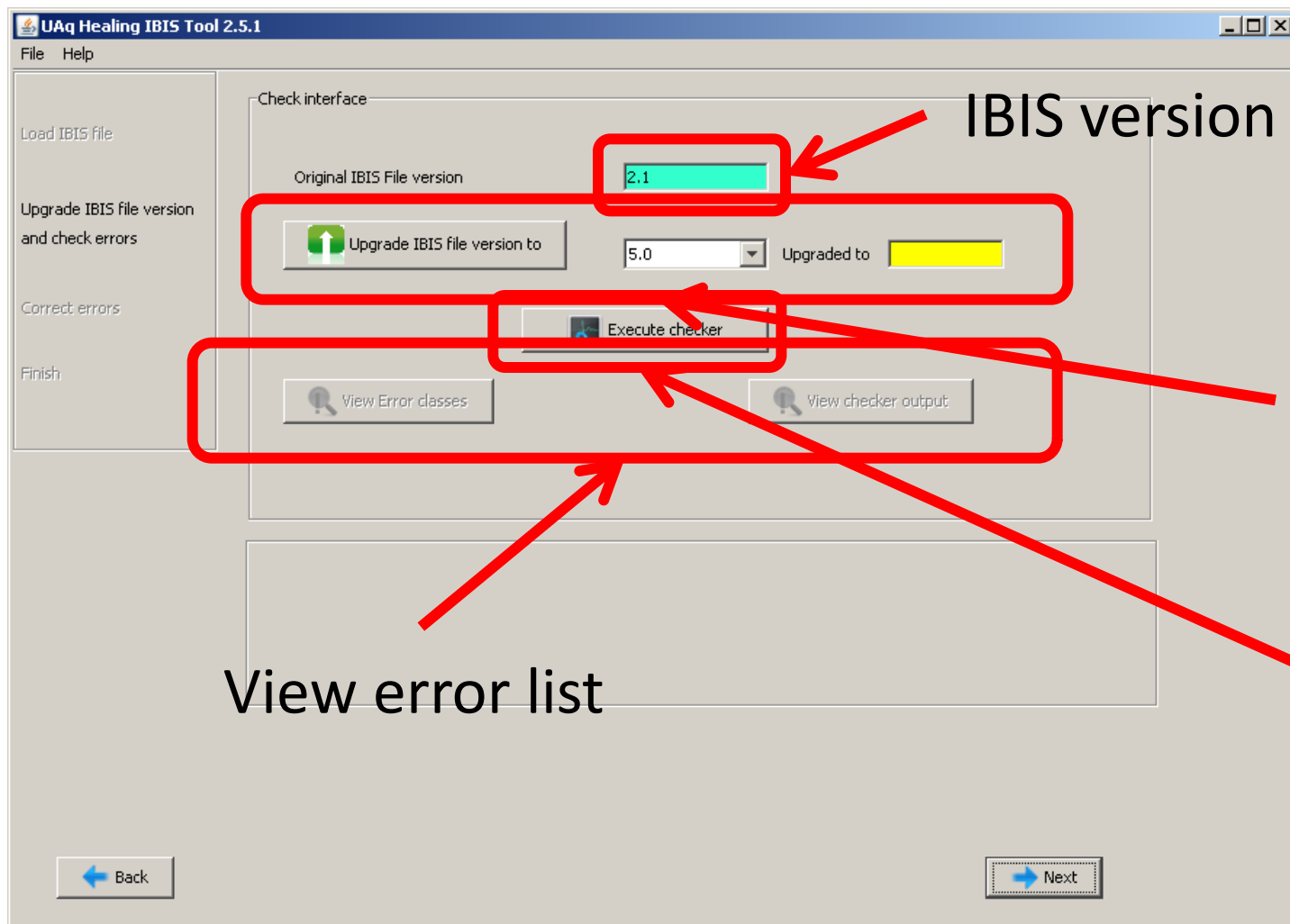
Developing an Healing IBIS Tool



P1: File Header	→	Rename ibis file in xxx_uaq.ibs
P2: Package value order	→	Order value in package raw
P3: C_comp value order	→	Order value in C_comp raw
P4: non monotonic data	→	Check and correct with linear approximation
P5: Vinl Vinh in model type	→	Erase value not specified in model type
P6: Vmeas, C_ref,	→	Erase value not specified in model type
P7: Extreme current	→	Erase value outside [-Vcc;+2Vcc]
P8: V-t V/I table mismatch	→	Scaling and offset correction

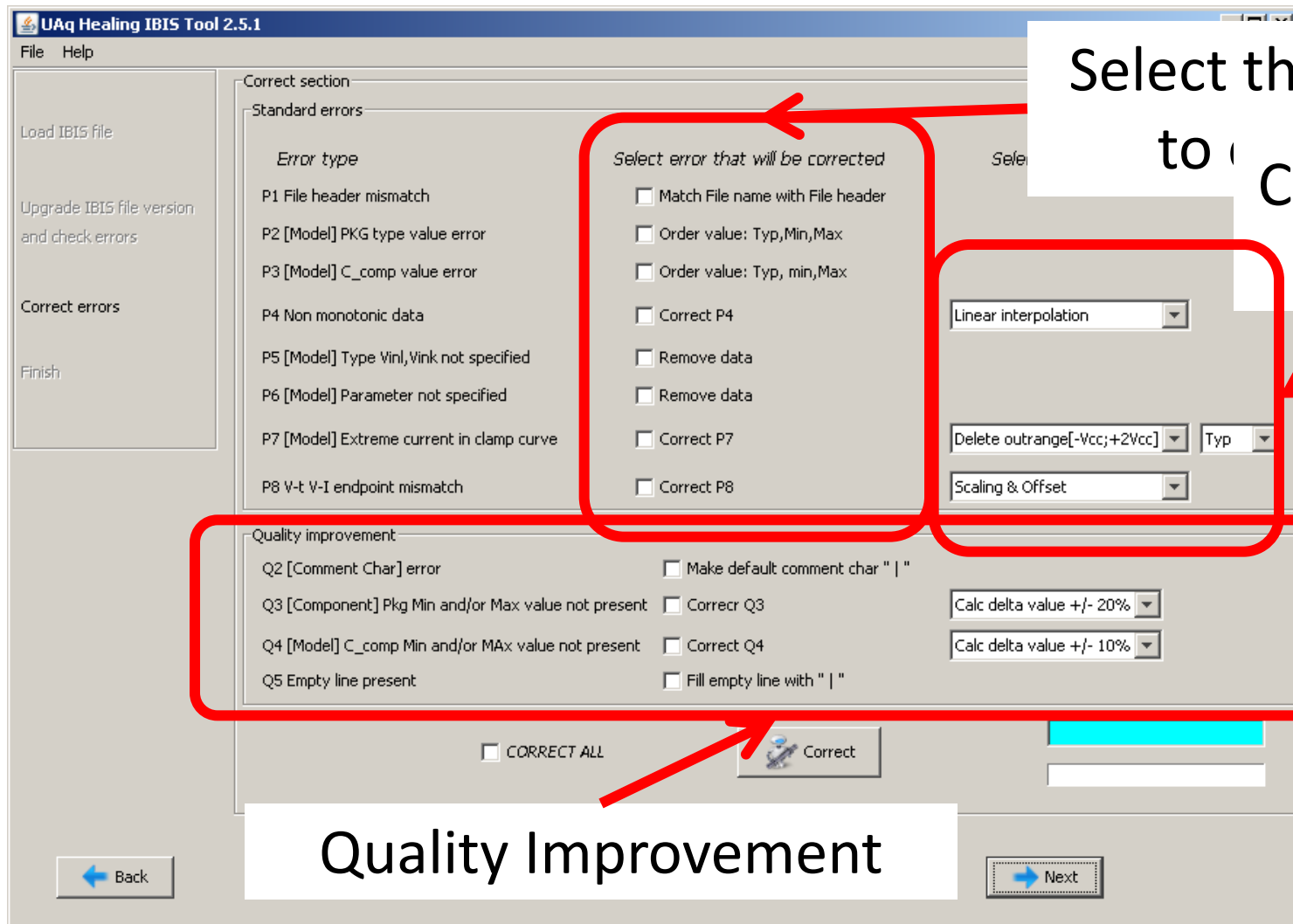
Q1: IBIS version	→	Upgrade IBIS using selectable menu
Q2: Comment char	→	Replace all comment char to default char “ ” in all raw
Q3: C_comp value min max	→	Min value = $\text{Typ} - (\Delta\% \text{ of Typ})$; Max value = $\text{Typ} + (\Delta\% \text{ of Typ})$
Q4: Package value min max	→	Min value = $\text{Typ} - (\Delta\% \text{ of Typ})$; Max value = $\text{Typ} + (\Delta\% \text{ of Typ})$
Q5: Empty line	→	Replace empty line with default comment char “ ”





Upgrade
before check

Execute IBIS
Checker



UAq Healing IBIS Tool 2.5.1

File Help

Load IBIS file

Upgrade IBIS file version and check errors

Correct errors

Finish

Correct section

Standard errors

Error type

P1 File header mismatch

P2 [Model] PKG type value error

P3 [Model] C_comp value error

P4 Non monotonic data

P5 [Model] Type Vinl,Vink not specified

P6 [Model] Parameter not specified

P7 [Model] Extreme current in clamp curve

P8 V-t V-I endpoint mismatch

Select error that will be corrected

☐ Match File name with File header

☐ Order value: Typ,Min,Max

☐ Order value: Typ, min,Max

☐ Correct P4

☐ Remove data

☐ Remove data

☐ Correct P7

☐ Correct P8

Linear interpolation

Delete outrange[-Vcc;+2Vcc]

Typ

Scaling & Offset

Quality improvement

Q2 [Comment Char] error

Q3 [Component] Pkg Min and/or Max value not present

Q4 [Model] C_comp Min and/or Max value not present

Q5 Empty line present

☐ Make default comment char " | "

☐ Correct Q3

☐ Correct Q4

☐ Fill empty line with " | "

Calc delta value +/- 20%

Calc delta value +/- 10%

☐ CORRECT ALL

Correct

Back

Next

Select the Errors
to
Choose your
strategy

Quality Improvement

Package Component

Typical cases of IBIS files Ignored by "IBIS-Checker5"

[Package]				
	VFBGA			
	variable	typ	min	max
R_pkg	0.1		NA	NA
L_pkg	2nH		NA	NA
C_pkg	0.2pF		NA	NA

* *hermon1x.ibs*

/typ	min	max
0.1	$typ - \Delta \%$	$typ + \Delta \%$
2.0nH	$typ - \Delta \%$	$typ + \Delta \%$
0.2pF	$typ - \Delta \%$	$typ + \Delta \%$

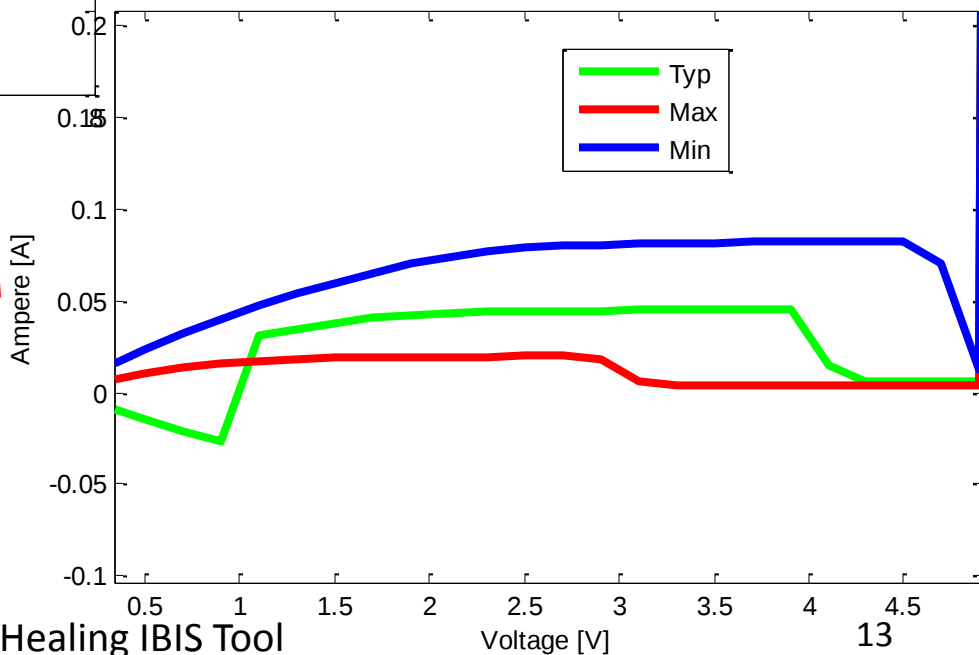
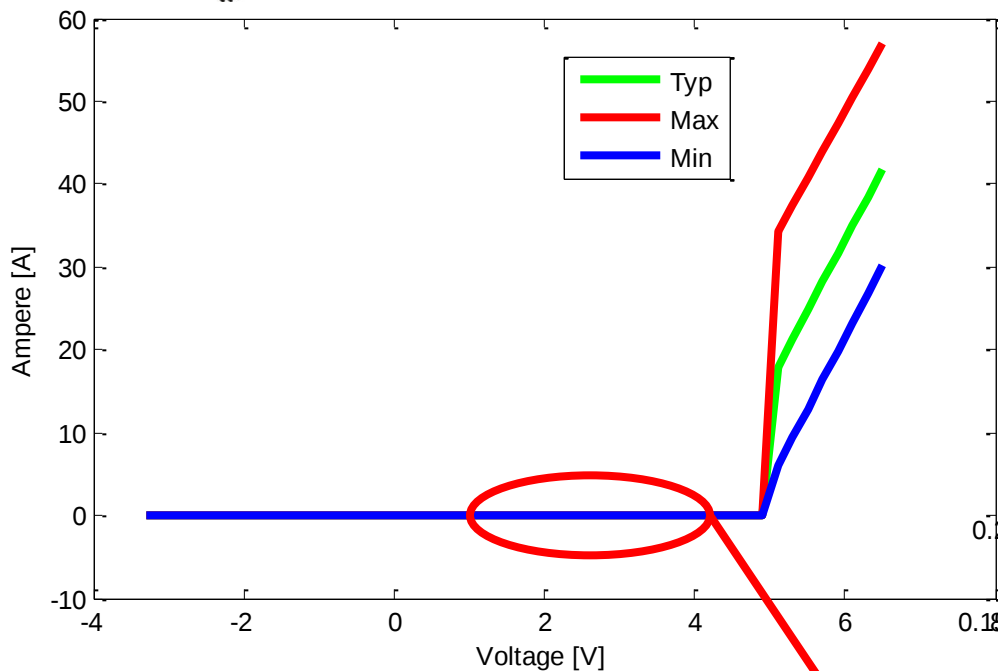
Vinh =	2.00V		
Vmeas =	1.54v		
C_comp	3.3pF	NA	NA

* *hermon1x.ibs*

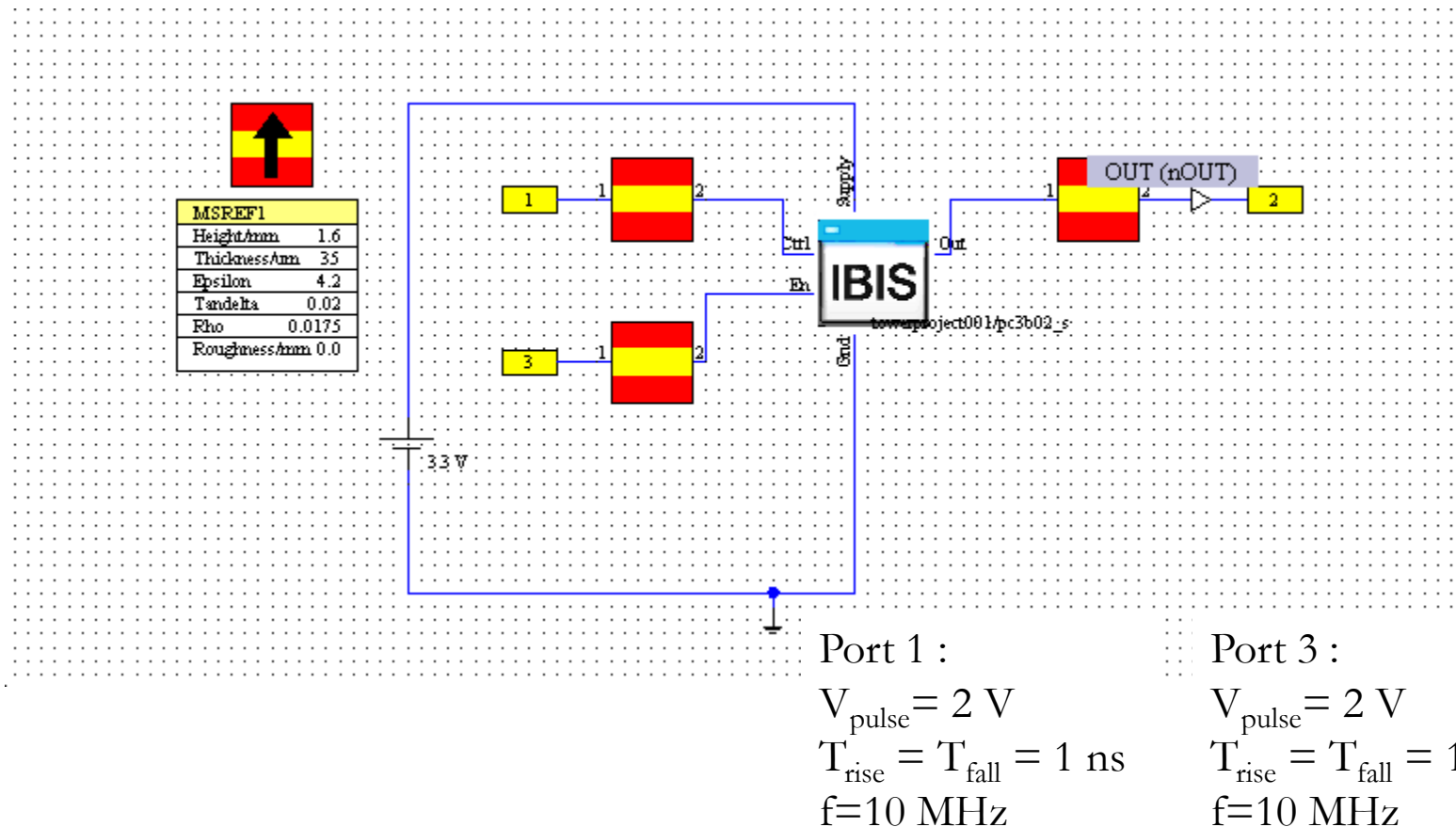
/typ	min	max
3.3pF	$typ - \Delta \%$	$typ + \Delta \%$

PullDown curve

- Must be Monotonic UP
- This tool is considered correct using Checker 4.2



IBIS testing environment



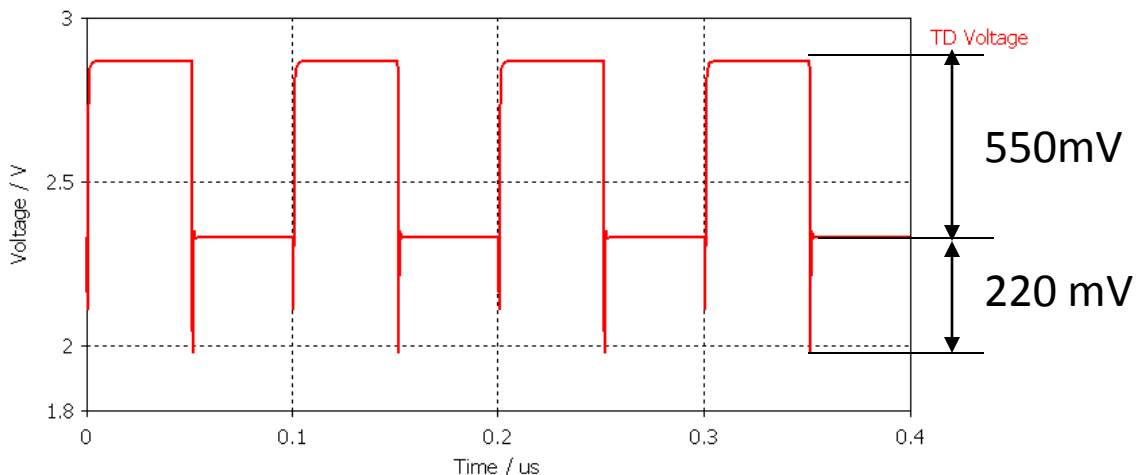
ORIGINAL IBIS model

Typical case

Signal input 10 MHz ;

$V_{\text{pulse}} = 2 \text{ V}$

Output at the Probe "OUT"



HEALED IBIS model

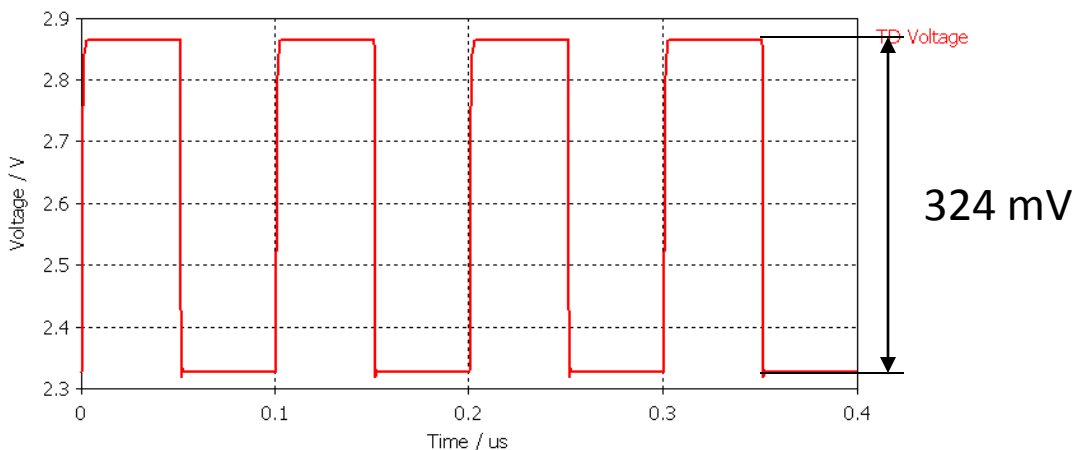
Only CAPACITANCE and PACKAGE VALUE

Typical case

Signal input 10 MHz ;

$V_{\text{pulse}} = 2 \text{ V}$

Output at the Probe "OUT"



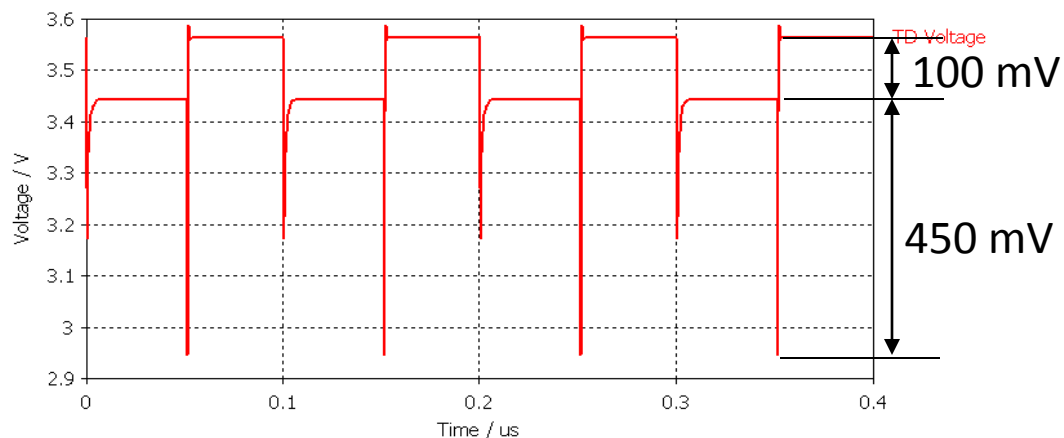
ORIGINAL IBIS model

Best case

Signal input 10 MHz ;

$V_{\text{pulse}} = 2 \text{ V}$

Output at the Probe " OUT "



HEALED IBIS model

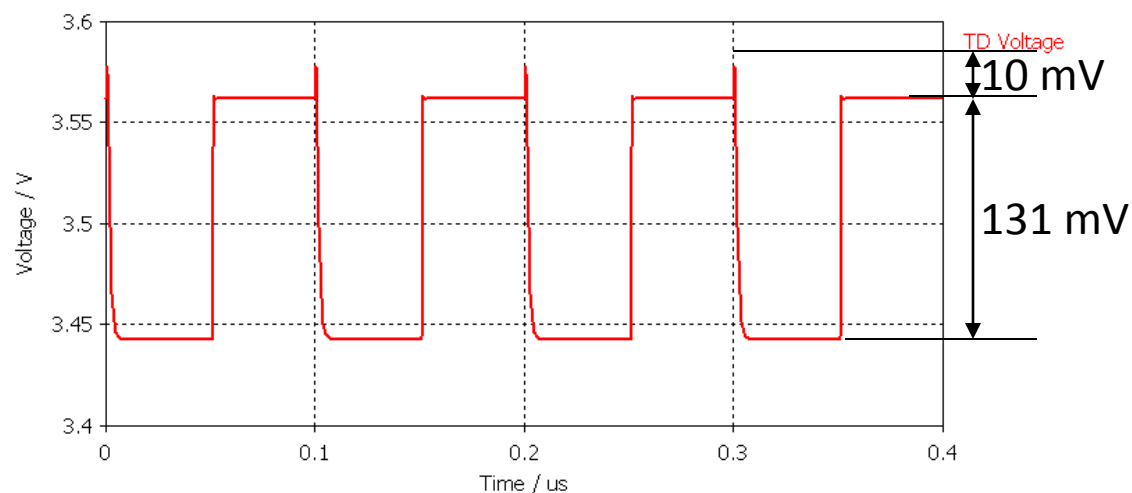
Only CAPACITANCE and PACKAGE VALUE

Best case

Signal input 10 MHz ;

$V_{\text{pulse}} = 2 \text{ V}$

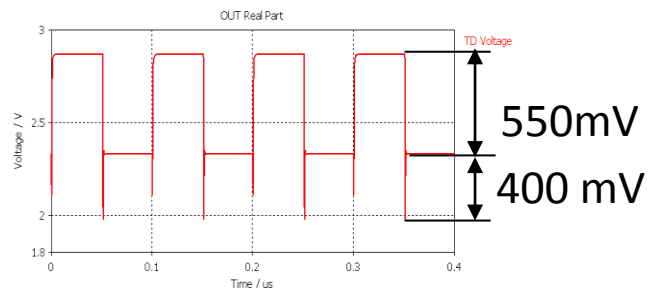
Output at the Probe " OUT "



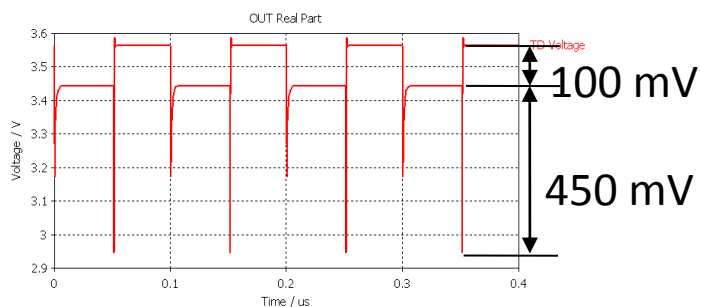
Original IBIS model

Healed all ERRORS & WARNINGS

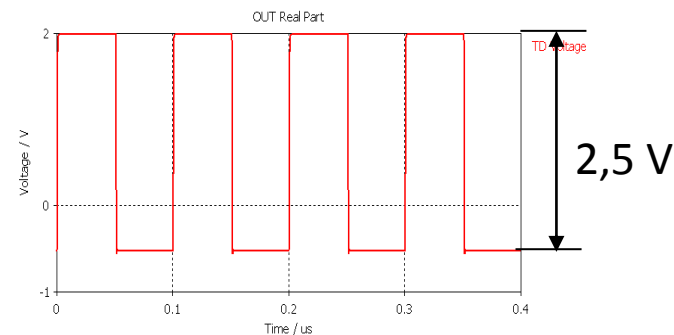
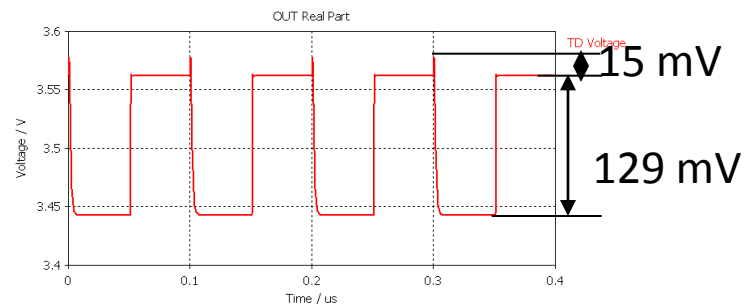
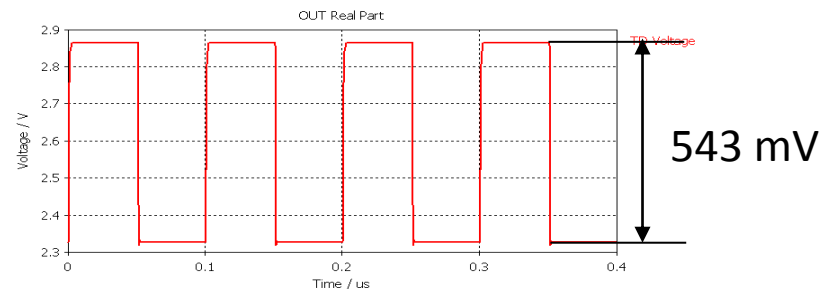
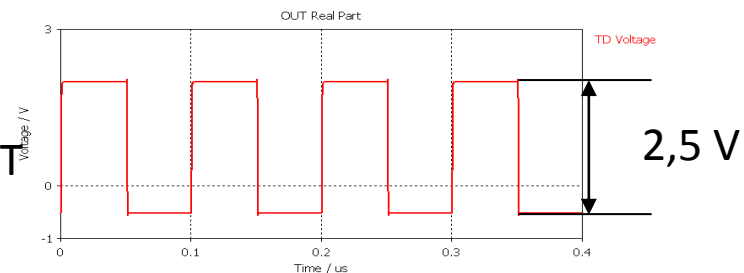
TYP



BEST



WORST



<i>Simulation with ORIGINAL IBIS model</i>	<i>Simulation with HEALED IBIS model</i>	REASONS
No differences among TYPICAL, BEST and WORST cases	TYPICAL, BEST and WORST cases are different	Better and complete description of the model
Ideal time domain behavior of voltage and current	More realistic time domain behavior of voltage and current	Capacitance order, parasitic value
Ideal time domain behavior of voltage and current for the TYPICAL case	More realistic time domain behavior of voltage and current	Correction of : •V/I table •Non monotonic data •V-t table

- Check errors on IBIS file
- Strategy selection to correct errors
- Quality improvement for IBIS file
- Generate a new IBIS file ready for simulation

- Write new strategy solutions
- Increase quality of the IBIS file
- Try a different IBIS checker

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