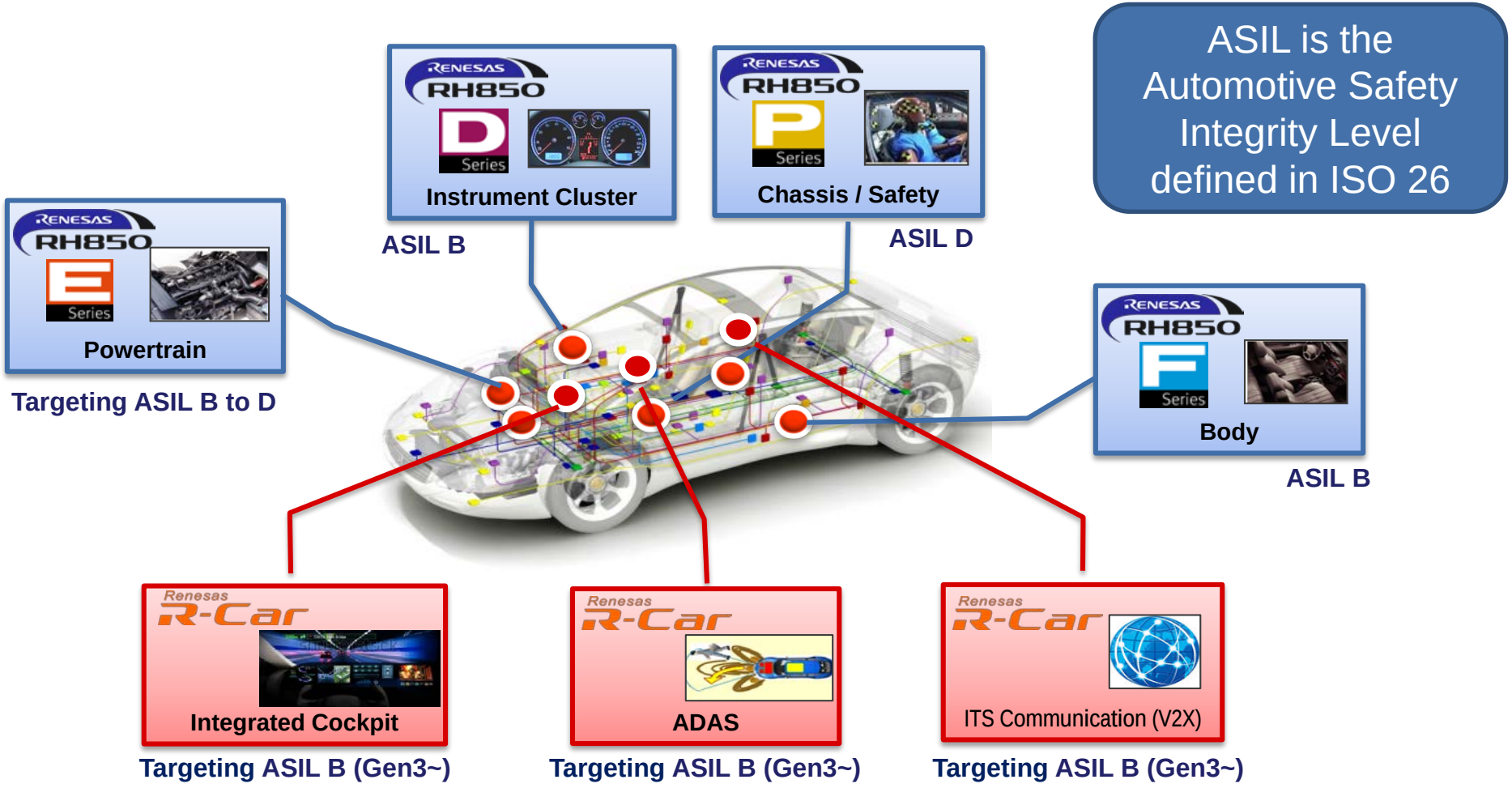
CUSTOMIZABLE ANALYSIS REPORT (CAR TOOL)

THE RENESAS FMEDA TOOL

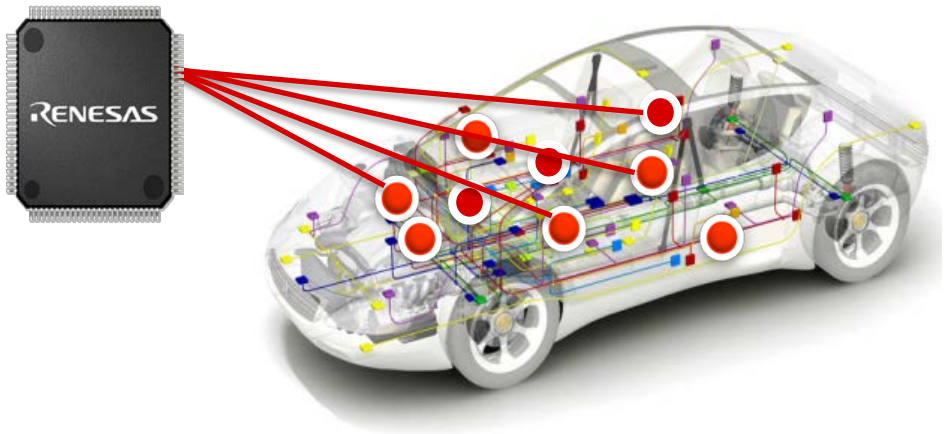
RENESAS ELECTRONICS CORPORATION

SAFETY IS A MANDATORY REQUEST FOR SEMICONDUCTORS



CHALLENGES IN APPLYING SEMICONDUCTOR TO SYSTEM

- In order to adapt a semiconductor to the customer's system, there are challenges during development. Below are some examples of challenges to realize development that is in compliance with ISO 26262.



Most products are developed as SEooC*, so the safety concept must be modified from assumptions to customer's "real" system.

Circuits are becoming more complex & larger. Calculating the metrics values for all elements is very laborious work.

As users make modifications during revisions of their safety analysis and architecture, a record of changes is required. Managing the revision history is very difficult.

*SEooC: Safety Element Out-of-context

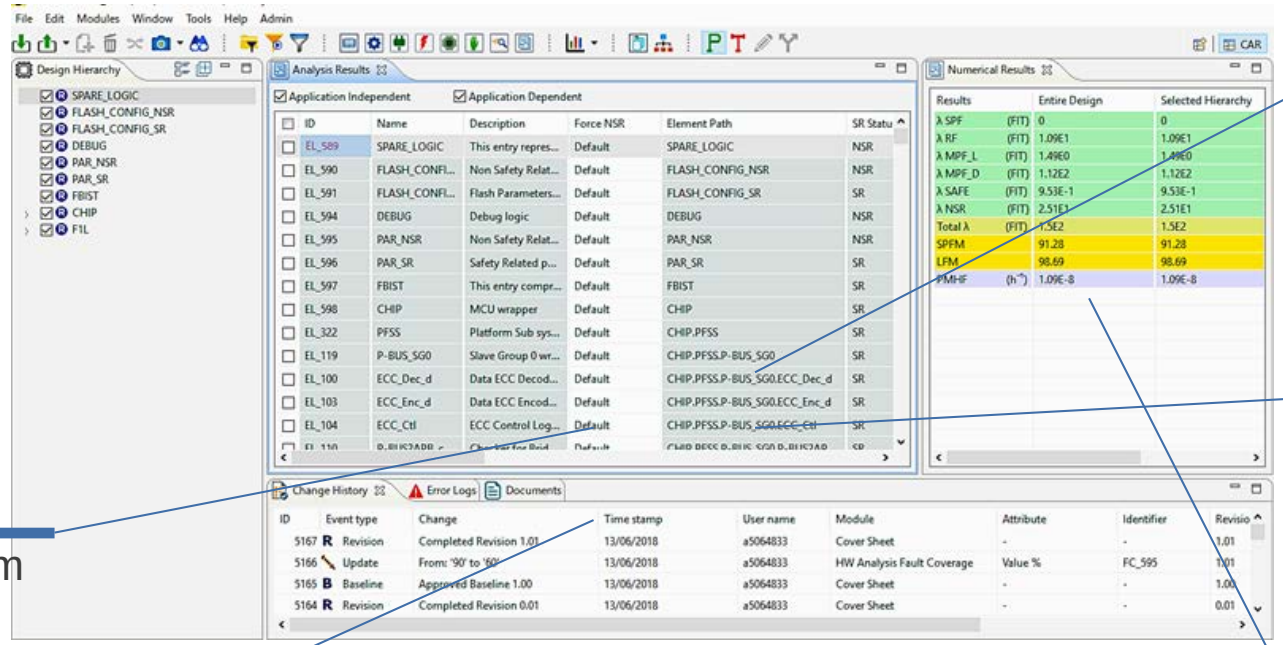
RENESAS IN-HOUSE FMEDA (CAR) TOOL

CUSTOMIZABLE ANALYSIS REPORT

Automatic calculation saves time

Able to select/add Safety mechanisms depending on customer's system

Automatically record a modification history



Reliable data base for Safety mechanisms

Applicable Safety mechanisms, Diagnosis coverage

Flexible parameter changes are possible

Failure rate, Failure type, Failure rate distributions, FTTI, etc.

Parameters can be Automatically calculated

H/W Architectural metrics, Safety goal violation rate

Able to add data

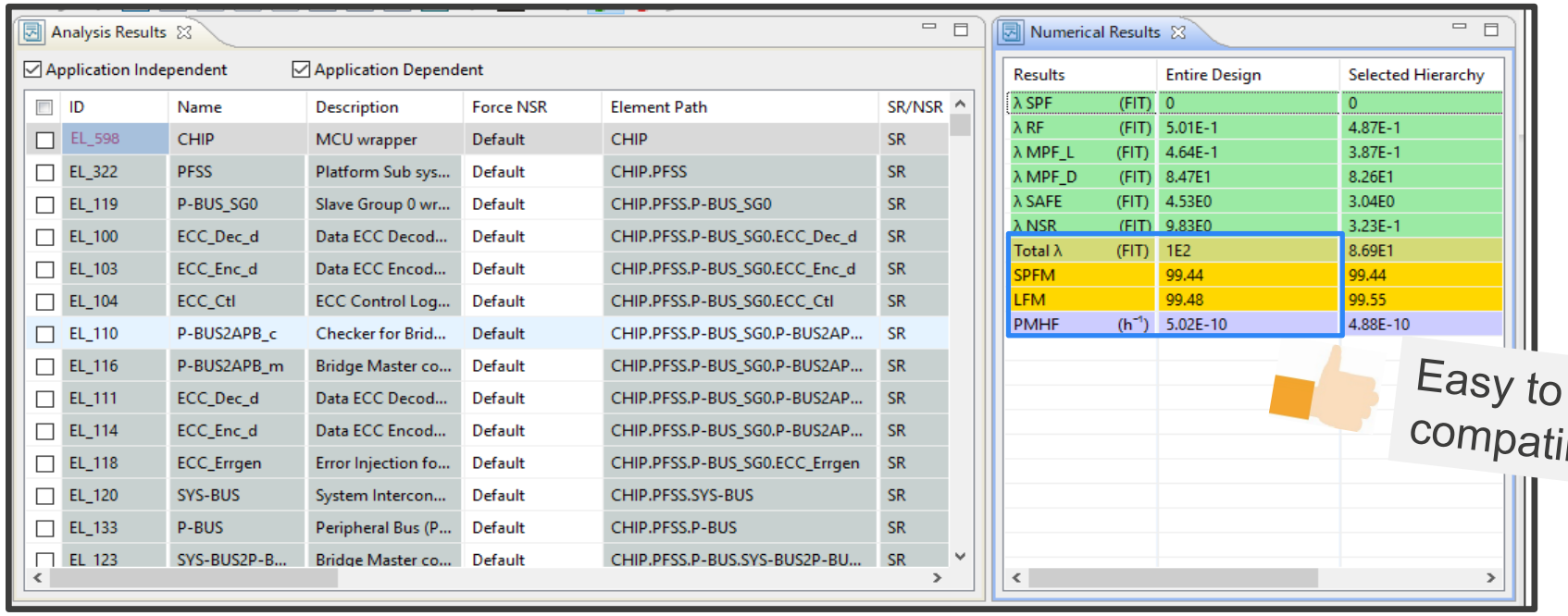
Failure mode, System safety mechanisms

Easy to control by GUI

Notifies input error/explanation

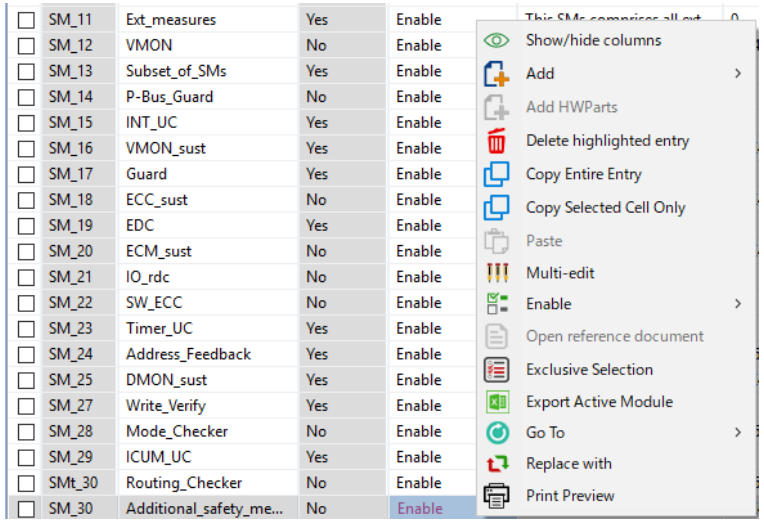
AUTOMATIC CALCULATION SAVES TIME

- GUI CAR tool automatically re-calculates the metric values (SPFM, LFM e.g.) upon user input data modifications (such as diagnostic coverage, Safety-relevance, etc.); the user can easily confirm achievement of their implementation!

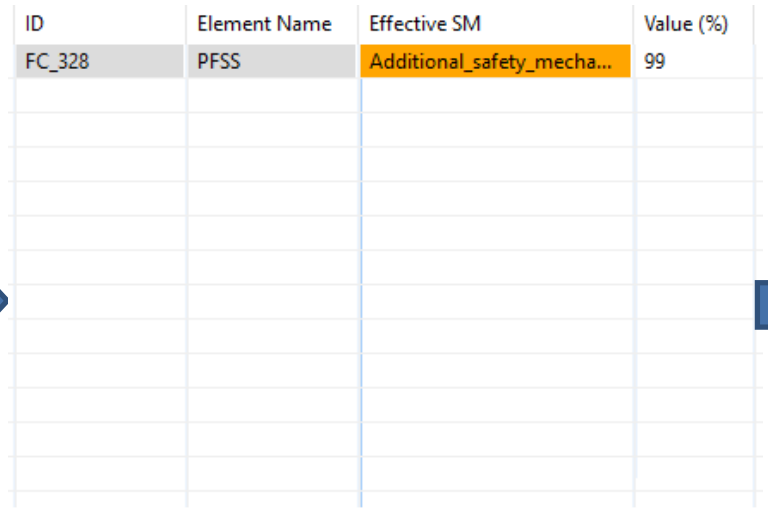


ABLE TO SELECT/ADD SAFETY MECHANISMS DEPENDING ON CUSTOMER'S SYSTEM

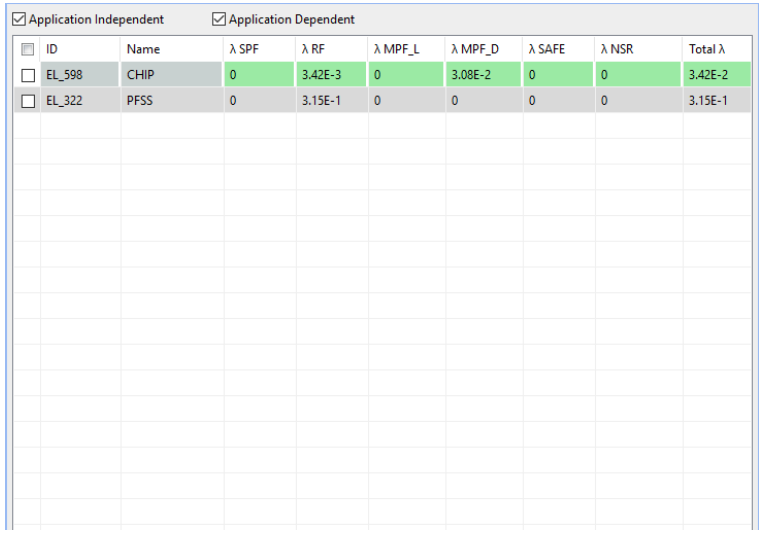
- Very easy to add/modify parameters, and metric values are automatically re-calculated.



Add a safety mechanism



Assign a safety mechanism and DC value to target element

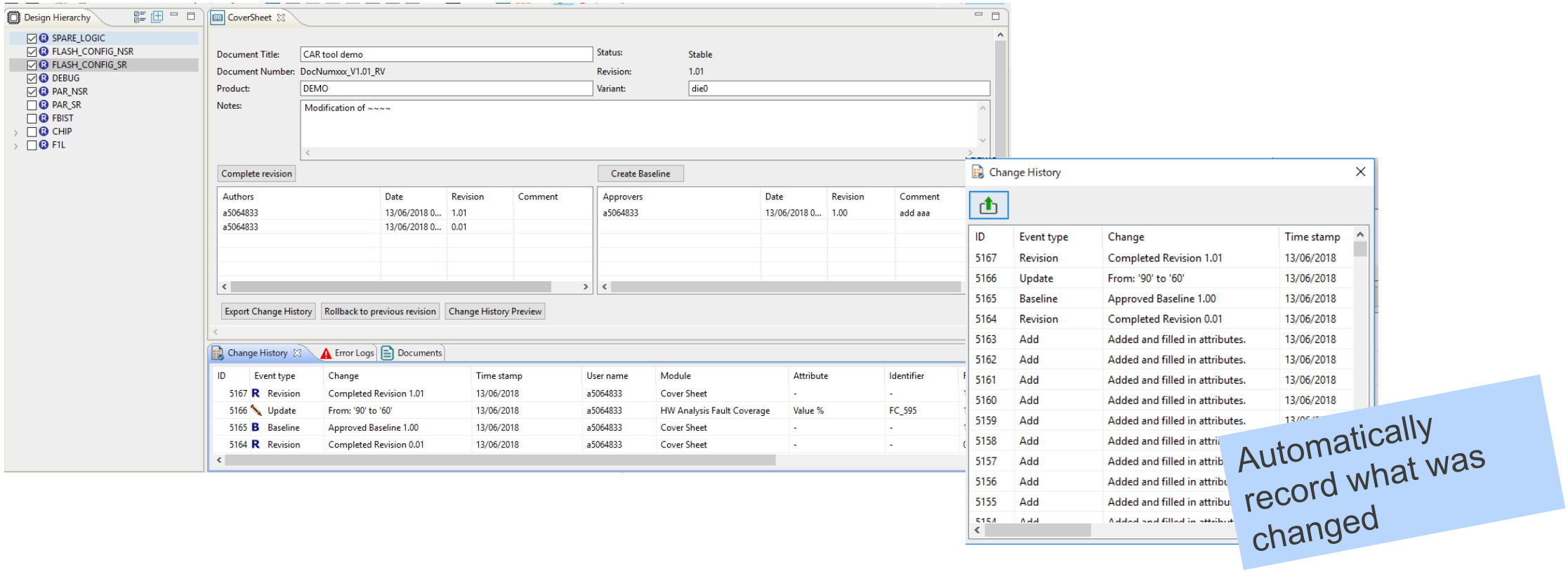


Confirmation of re-calculated metric value

Only 3 steps to modify the safety mechanism.

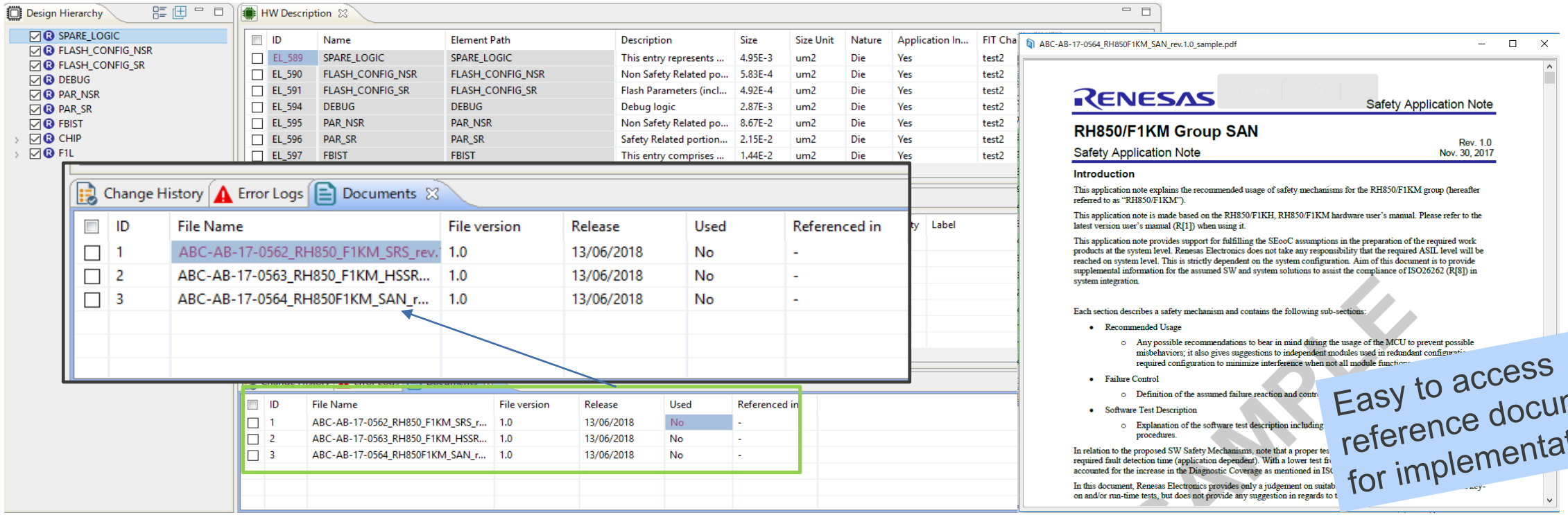
AUTOMATICALLY RECORD A MODIFICATION HISTORY

- GUI CAR Tool automates revision control and change history generation, so users can easily manage and track what has been changed.



CAR TOOL IS NOT JUST A CALCULATION TOOL

- Reference documents (e.g. functional safety work products) can be embedded in the GUI CAR tool and they can be accessed during safety analysis.



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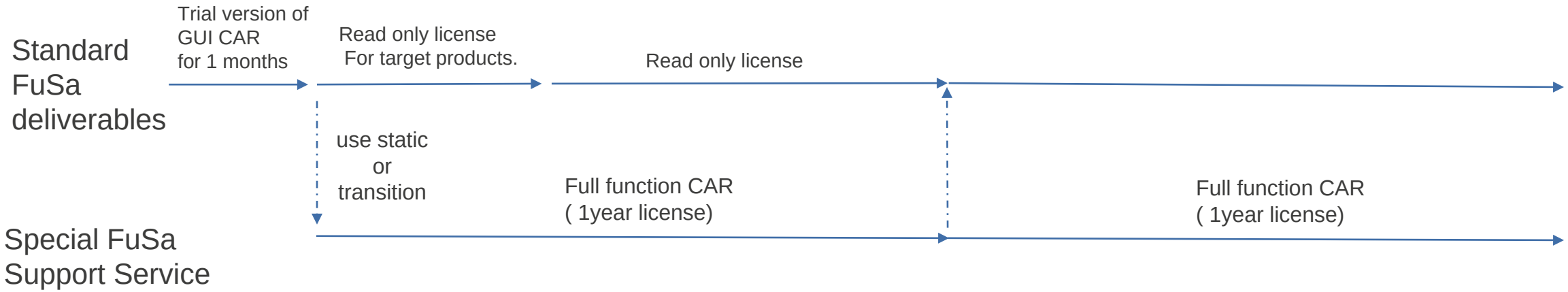

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LICENSE OVERVIEW

- The difference between full function license and Read-only license is described below. A Read-only license can only confirm the result of Renesas quantitative analysis; for analysis of system configuration, modification using other tools is required.

Tool evaluation

-1month license period.
- Export functions are limited.

Trial license

Available to customize (modify) per customer's system.

- License period is 1 year.
- Available to confirm the result of quantitative analysis within Renesas SEooC.
- Functionality available to add/modify parameters for customer's system configuration.

Full function license

View result of Renesas qualitative analysis (based on AoU*)

- License period is unlimited.
- Available to confirm the result of quantitative analysis within Renesas SEooC.
- All parameters are locked; modifications are not possible.

Read-Only license

*AoU: Assumption of Use

HOW TO GET GUI CAR TOOL?

- CAR tool is one of the work products in our safety support program.
  For details, please contact the local sales team.

Standard FuSa deliverables
(Free of charge)

- DIA template
- Safety requirement specification
- Safety application note (HW SW interface)
- Static FMEDA
- Safety case summary
- Functional safety assessment report

Read-only license

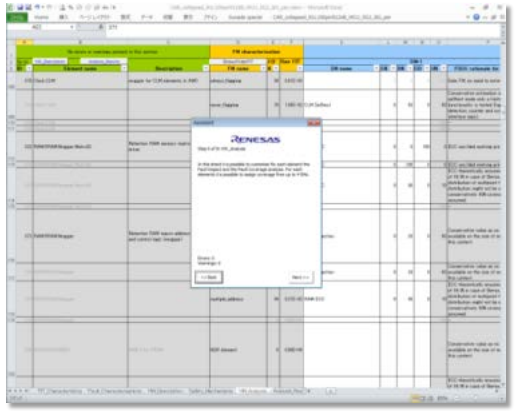
FuSa Support Options
(Optional charged deliverables & services)

- Customizable Analysis Report (CAR)
- Functional safety technical sup
- Safety Workshop
- FuSa SW products

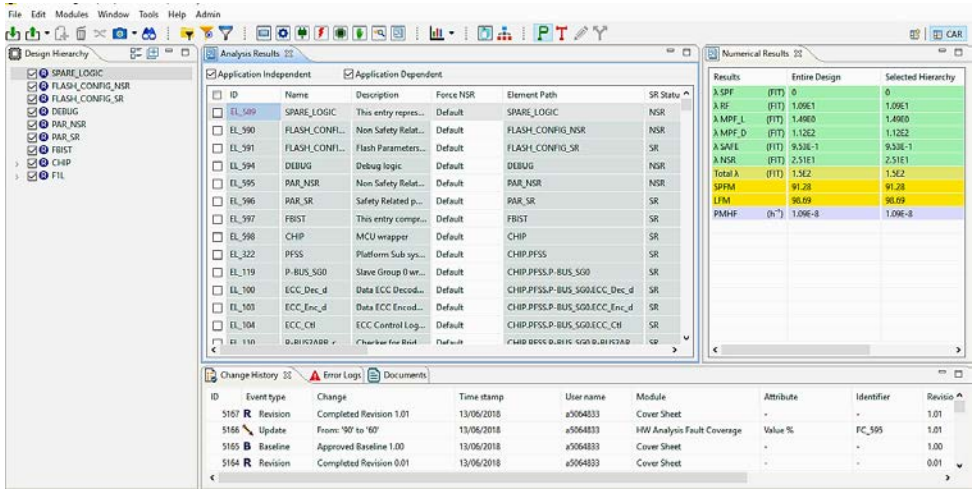
full function license

TRANSITION PLAN FROM EXCEL BASE TO GUI BASE

- Renesas will provide GUI base CAR tool from next generation of MCU (RH850) and 3rd generation of SoC (R-Car). Gen1.0 & 1.5 MCU products are basically supported by Excel based CAR tool.
  For long term, we'll convert these data to GUI base CAR tool.



Excel base CAR tool
Gen 1& Gen 1.5 products of MCU (x1x series)



GUI base CAR tool
2nd generation of MCU(x2x series)
3rd generation of SoC (x3x series)
(TBD)

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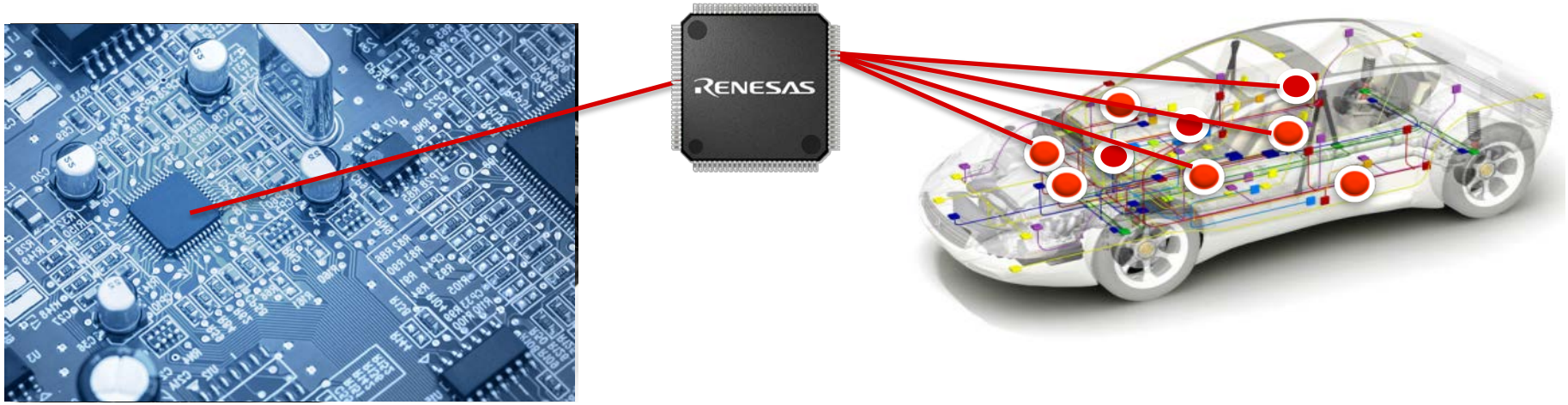
SEOOC*: CUSTOMIZATION CHALLENGES

In-Context:
- Intended for use in a specific item
- Safety goals are fixed
- Safety requirements are clearly defined
- Safety HW is customized for use case
- “Top-down” approach is mainly used

Out-of-context
- Intended for use in multiple and different items.
- Safety goal information only considered
- Safety requirements are assumed
- Safety HW is implemented based on assumed use
- Combination of “top-down” plus “bottom-up” approaches is used



*For this and all other slides, SEooC (Safety Element Out-of-Context) refers to a component.