THE TEST ACTIVITIES IN RENESAS USING FUEGO

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RENESAS

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  - “R-Car”, Renesas product for Automotive
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  - Approaches: Summarize Test Results and Make a Report Automatically
  - The Automation Test Report Feature
- The future of our efforts
  - In the future

INTRODUCTION

ABOUT RENESAS(1/2)

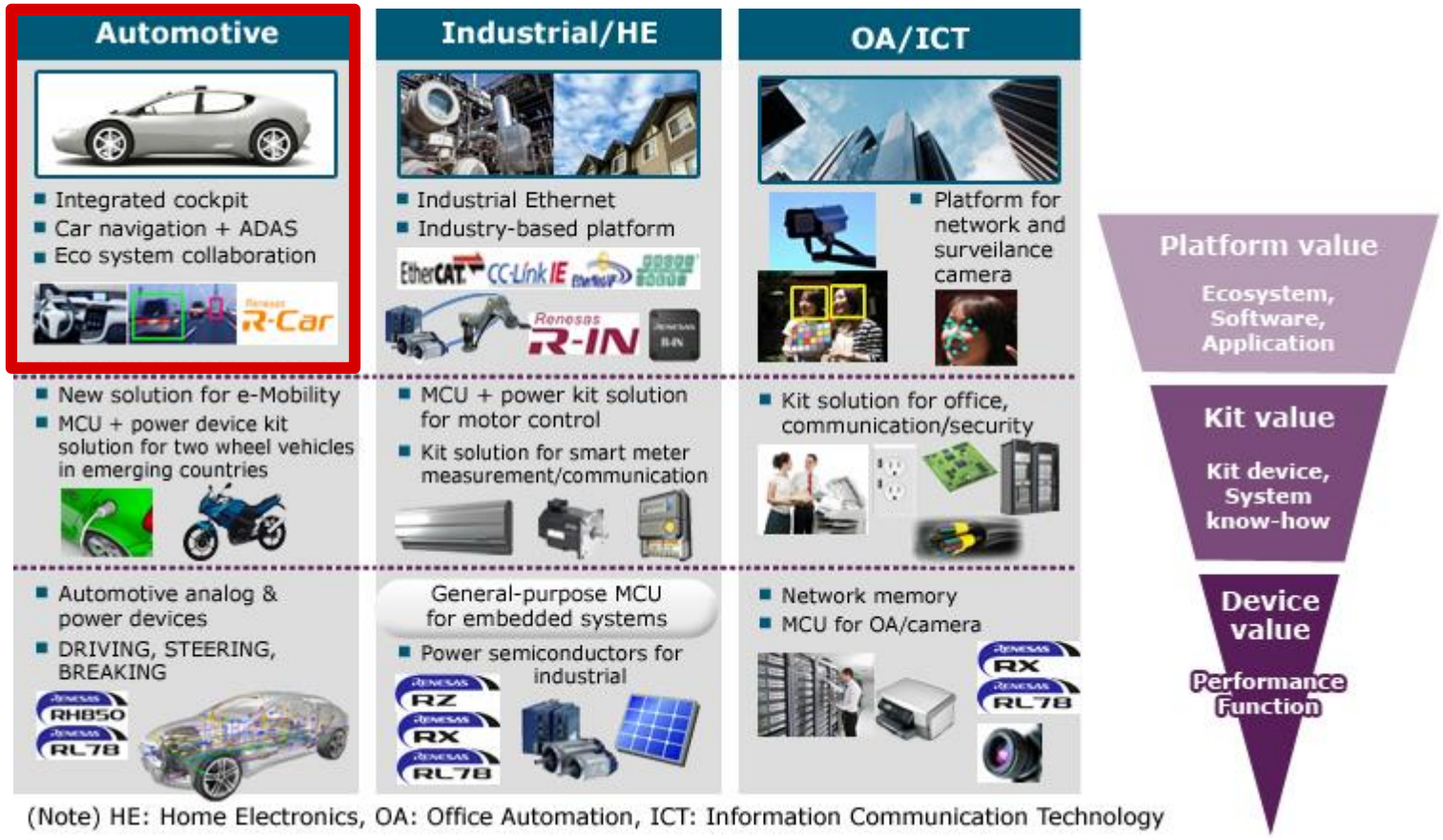
- Headquarters: TOYOSU FORESIA, 3-2-24 Toyosu, Koto-ku, Tokyo 135-0061, Japan
- Main Design Office in Japan: 5-20-1, Josuihon-cho, Kodaira-shi, Tokyo, 187-8588, Japan

Headquarters

Musashi Office

ABOUT RENESAS(2/2)

Solution Offerings for 3 Focus Domains



(Note) HE: Home Electronics, OA: Office Automation, ICT: Information Communication Technology

- To develop a safe, secure, comfortable and eco-friendly society, Renesas offers three layers of solutions to provide optimal services with added value for customers in our three focus domains: **Automotive**, **Industrial/HE**, and **OA/ICT**

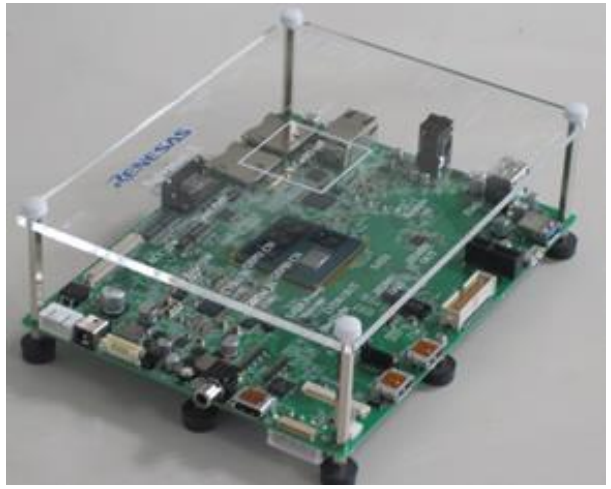
“R-CAR”, RENESAS PRODUCT FOR AUTOMOTIVE

Introduction of R-Car

- "**R-Car**" is the nickname for Renesas' lineup of system-on-chips (SoCs) for car information systems.
- R-Car H3 conforms to the ISO 26262 (ASIL-B) functionality safety for automotive.

URL: https://www.renesas.com/en-us/products/automotive-lsis/r-car.html

R-Car H3 SoC



R-Car H3 Reference Board

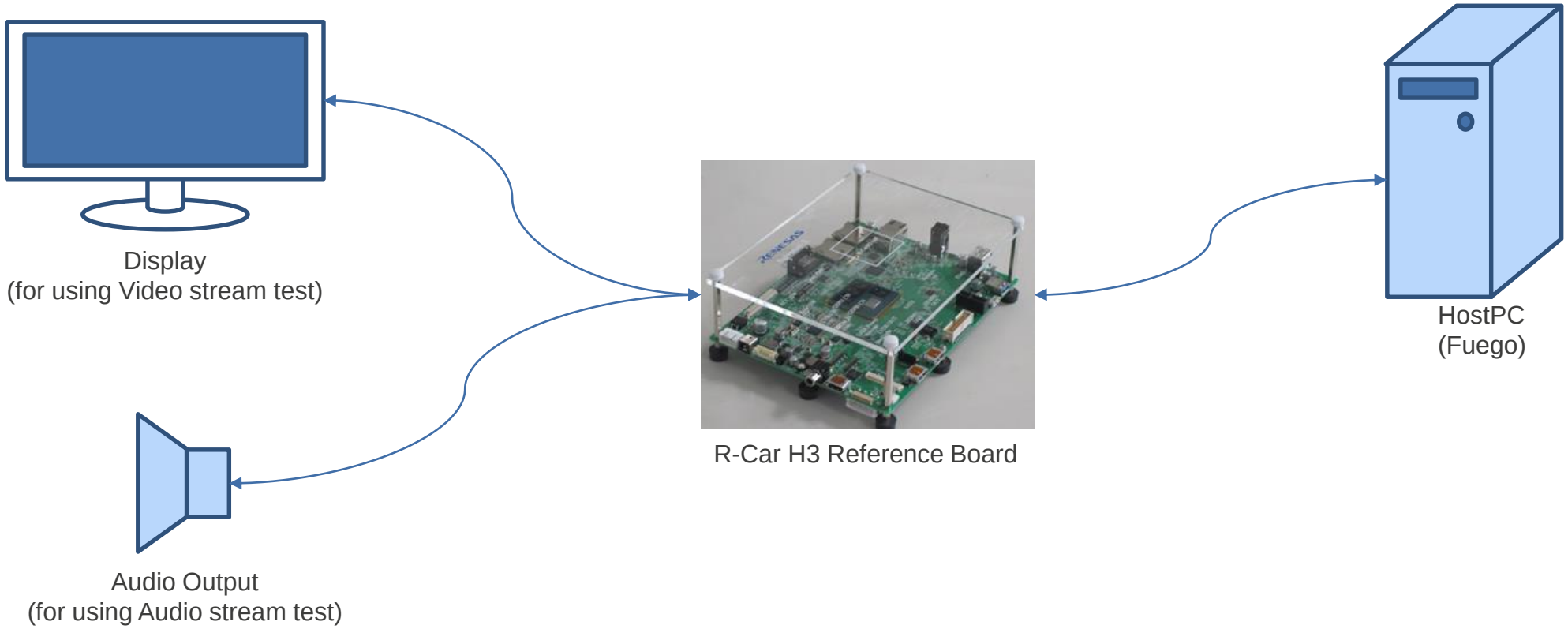
SELF-INTRODUCTION

- **Presentation speaker(Nomura)'s history:**
  - Previous
    - Protocol stack using IEEE1394(Firewire) (AV amplifier, Information Home appliance, etc…)
    - Cellar phone development (Communication Driver development)
    - Smart phone development (System Integration, Software Configuration Management)
  - Current
    - R-Car System Test Execution/ System Test Environment development

ACTIVITIES

TEST ENVIRONMENT

- **Test Environment Image for R-Car Test**



MOTIVATION:
THE ACTIVITIES IN RENESAS USING FUEGO(1/3)

The environment around Renesas development previous Fuego

- The development test (BSP/Driver/System test/etc) for whole the system is executed manually by most testers.

  ⇒ Want to execute the tests efficiently, to reduce their man-hour and to improve their TAT.

- It has take long time to go around the test cycles (Development → Test → Issue Detect → Improvement → Re-test →…)

  ⇒ Want to improve the development cycles.

- It takes time to execute tests and make some issue reports. And the results may not be constant by each tester's experiences and skills.

  ⇒ Want to keep the constant qualities for the test results and those reports.

- Because test environments and test methods in each development teams/development projects are different, the quality(reliability) of test cases and the test programs(scripts, etc.) are lower.

  ⇒ Want to keep the test quality constantly by unifying the test environment for the entire development team /project.

MOTIVATION:
THE ACTIVITIES IN RENESAS USING FUEGO(2/3)

The motivation for using Fuego

- Improve TAT of Test
- Up the quality of Test
  - Early response and early release for issues/problems
  - Quality up/Maintenance for test execution and those results
- Unify the verification environment in the whole project.

  The same test cases can be used shared by multiple development teams/ project:
  - To execute system test with the test criteria which was unified in development project.
  - To determine the entire project about the excess and deficiency of verification items.

⇒ Fuego will execute all of test items.

- Human(tester) has only to push the "start test" button.
- Those test results will output automatically also.
- Anyone can execute the tests, and anyone can get the same test results.

MOTIVATION:
THE ACTIVITIES IN RENESAS USING FUEGO(3/3)

Advantage of using Fuego

- Easy-to-understand design
- Intuitive operation system using Web UI

  ⇒ Can start to tests on the one action(push "test start")

  ⇒ Can execute tests from other platform(OS)
- Easy-to-implement test program(test script)

  ⇒ Since it is possible to distribute the test cases as the scripts, the same test cases can be used shared by multiple development teams/project.

  ⇒ Getting some test scripts from the OSS, and it can be used as part of a test case.
- It is possible to create a unified development environment(build-integration-test) in the future.
- Multilingual(Important in large-scale/multi-site development)

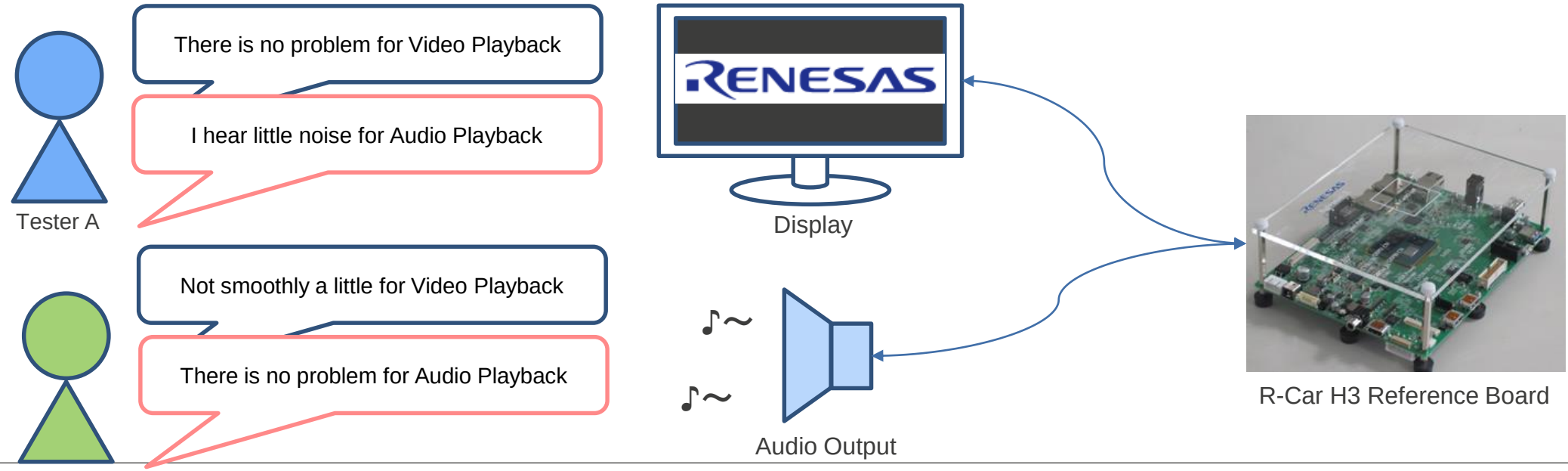
ACTIVITY: TEST AUTOMATION(1/3)

- **How activities is Renesas doing currently?**
  - Full automation of the test
    - To automate the operation check of the entire R-Car System based on the system specification.
    - ✓ Check the operations of each function for R-Car PF(Each I/F confirmation/ Multimedia(Audio/Video) confirmation/ etc.)
    - ✓ CPU performance
    - ✓ Bus performance
    - ✓ Benchmark, etc…

    ⇒ Execute all of test items using Fuego except some test items which need to do manually.
    e.g. connecting/disconnecting of external cable/storage
  - Create the test result reports automatically after test executing
    - ✓ Summarize the test results(logs) automatically, and output them as a report.

ACTIVITY: TEST AUTOMATION(2/3)

- Especially, it is difficult to confirm the Audio/Video playback results automatically.
  - Usually, since we have confirmed multimedia playback depending on our ears and eye balls performance,
    - ✓ It may be difficult to decide “OK or not” for those tests results programmatically.
    - ✓ The test results by the tester may be different.



ACTIVITY: TEST AUTOMATION(3/3)

- **Established methods of mechanically determined "OK or not", improve the quality of the test by performing on Fuego**
  - Approach
    - ✓ Based on the defects information of past development, investigate the defects and classify those results
    - ✓ Devise the best defect detection methods based on those survey results. (Also consider the use of libraries and tools which have been published)
    - ✓ Do not intend to introduce expensive 3rd-party application and so on (as much as possible).

APPROACHES:
THE AUTOMATION TEST FOR AUDIO/VIDEO PLAYBACK

- **How does Human determine OK or not for Audio/Video playback?**

  ⇒ Examine the defects and those causes in the past development.

- Sound interruption/ Silence state
  - Is Audio played without break? Does it occurs the silent section which does not assume?
- Noise
  - Are there any noise(errors) in the data itself?
  - Does not it occur another error factor(from other devices and bus load and etc.)?
- Skipped frames
  - Does not it occur Skipped Frame/Delayed Frame?
- Bit rate/ Sampling rate/ Format
  - Does it have been played using supposed set value?

APPROACHES:
SUMMARIZE TEST RESULTS AND MAKE A REPORT AUTOMATICALLY

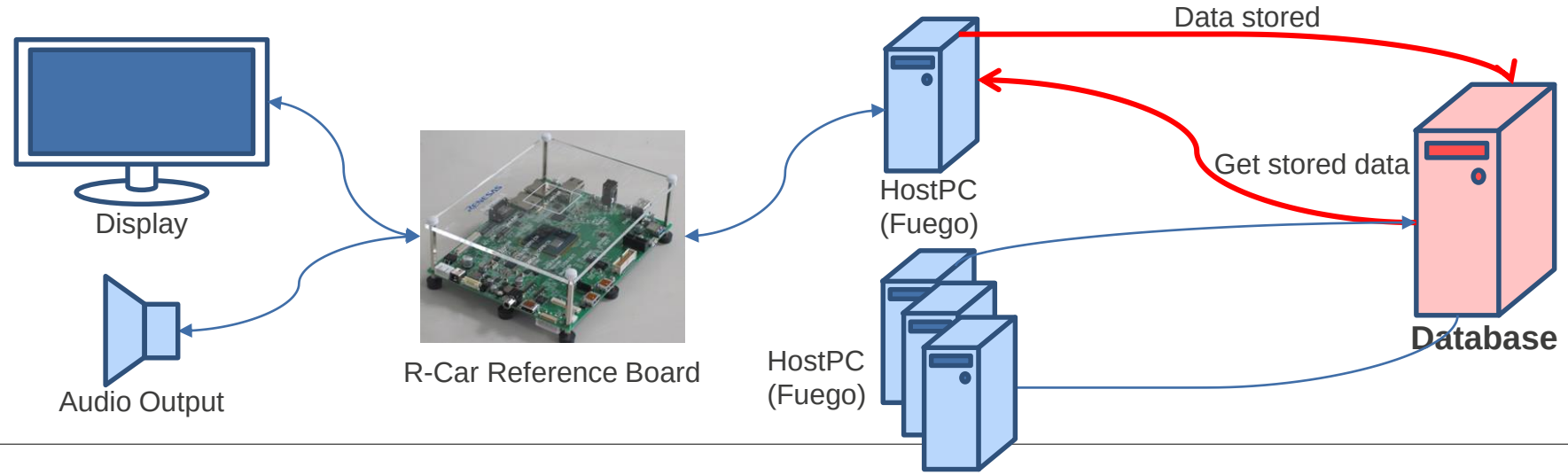
- **Summarize the test results as a report**
  - Were the test results OK or not?
  - If some issues were occurred, Where/How?
  - If compared with previous test results, what conclusion can be derived? (Degraded has occurred and so on.)

THE AUTOMATION TEST REPORT FEATURE(1/2)

The Automation Test Report Feature

⇒ Gather the test log data after test, and make a report using a template.

- Whoever can make an objective test report.
- Even if executed a long time test, we can confirm the status just by checking output reports.
- The test results reports will be managed in a database centrally. It can be searched and output and compared using Database system about the past test results.



THE AUTOMATION TEST REPORT FEATURE(2/2)

Template Sample

- PC report info: Ubuntu
- Environment: Linux
- Target board: R-Car
- Note:

Test name	Results	Durations	Details-Comments
Test Case #01			
	passed		
Test Case #02			
	passed		

THE FUTURE OF OUR EFFORTS

IN THE FUTURE

- We don't have the methods which can be confirmed all test items automatically yet. We are going to improve/develop our activities furthermore.
- Enlightenment activities to in-house development team/ development project for Fuego & that test scripts.
- Make the total development environment which were also included the integration task using Fuego.

  ⇒ to realize the development cycle:
  (Coding → Integration →Build → Test → Modification → Re-Test →･･･)
- Contribution to the Fuego Upstream using the Renesas development(test scripts and so on).

www.renesas.com