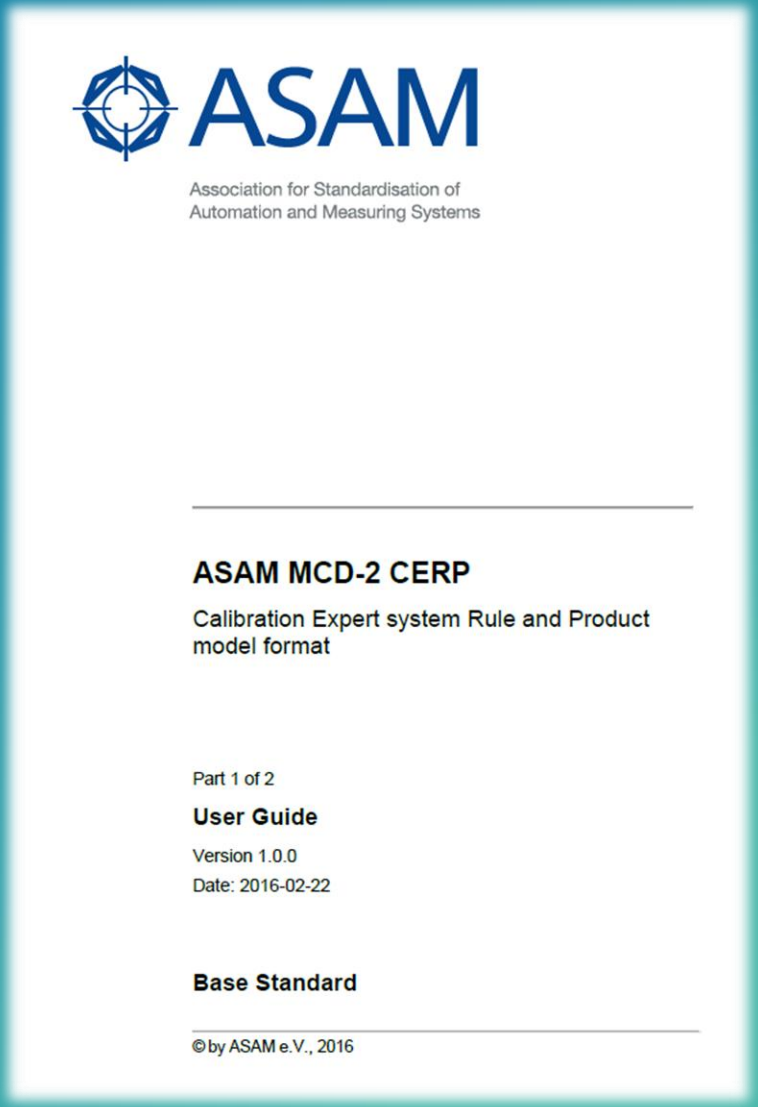
ASAM Regional Meeting Japan 2019

Activity report:

ASAM MCD-2 CERP Study Group



Tadamasa Sato
TOYOTA MOTOR CORPORATION

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5	本日のまとめ Wrap Up
6	Study Groupを終えて After CERP Study Group

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1-1. Explosive Increase of Calibration Parameters

ECUs

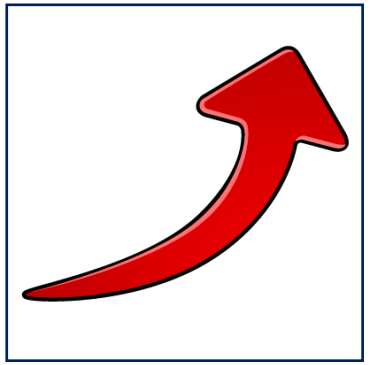
Sophisticated Electric Control

Control + Body + IT + ···

High-class Car ECUs > 100

×

Variants



Needs are of great variety

Destination, Environment,
Emission regulation, Option

Parameters

Huge Calibration Parameter

Decade Ago : Several thousands

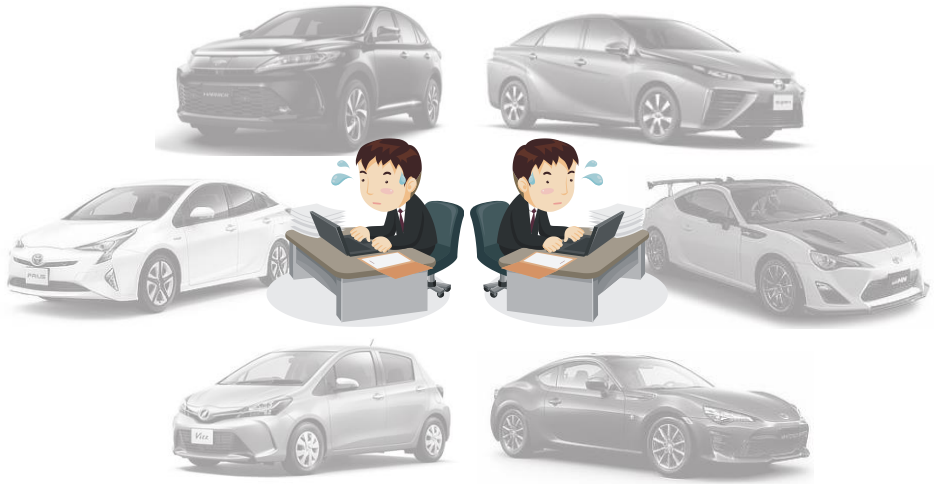
Now : Tens of thousands
(Engine Control)

Can an engineer handle it ?

1-2. Validation of Calibration Parameter ～On-site Problem～

「Safety」「Comfort」「Eco」「Clean Emission」「Power」and「Seasoning」
To meet the trade-offs, we have **Huge Validation Tasks**

- **Impossible all parameter checks**
- **Difficult review**
- **Ambiguous formal knowledge**
- **Aging calibration expert**

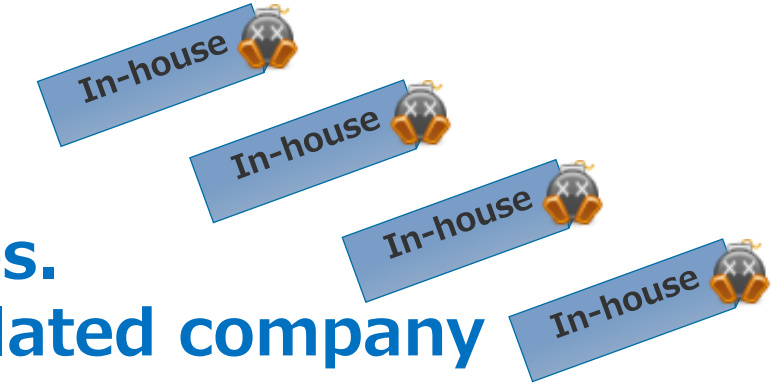


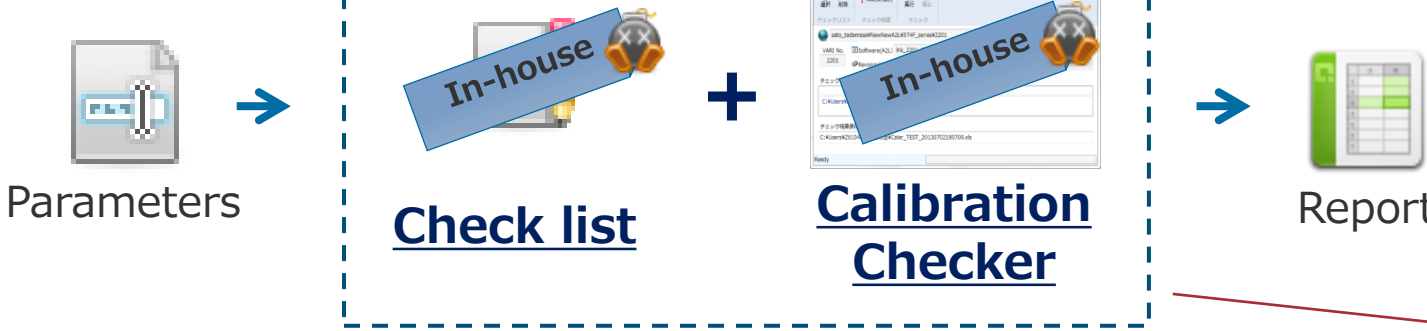
(Moreover)
Collaborative work between OEM, Suppliers and Calibration Companies
Need Consistent Validation Process

1-3. Check the Validity of Calibration Parameters ～On-site Task～

Build the on-site operational process and cycle the tool development and improvement.

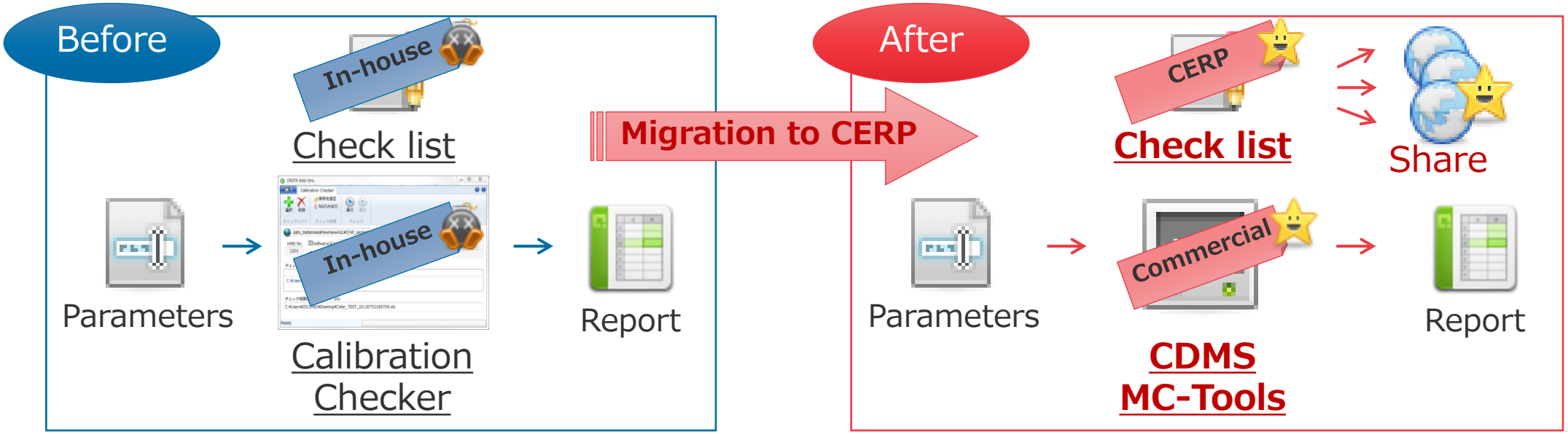
① **Pile up the check knowledge**
② **Define the rule of checklists**
③ **Develop check tools**
④ **Do ② and ③ , if new check rule comes.**
⑤ **Share the checklists and tool with related company**





(Example)
- parameter range
  -100 < x < 100
- equality between parameters
  x = y + z
- magnitude relation between parameters
  x > y + z

1-4. Purpose of Using MCD-2 CERP



Merit of CERP application

- **No more rules** (CERP standard itself)
- **No more in-house tool development** (commercial tool)
- **No more sharing in-house tools** (CERP file only)
- **Parameter check/validation at additional situations**
  (Simulation / Calibration on the actual H/W unit / Parameter database management)

Formation of calibration knowledge is the OEM's task.

1-5. MCD-2 CERP Standard Datasheet

Datasheet

(ASAM HP)

Title	Calibration Expert System Rule and Product Format
Domain	Measurement & Calibration
Current Version	1.0.0
Release Date	22 Jun 2016
Application Areas	• ECU calibration parameter checking
Specification Content	• API specification • UML model • XSD schemata
File Formats	• XML

Standard Authors

AVL LIST GmbH,
dSPACE GmbH,
ETAS GmbH,
RA Consulting GmbH,
Robert Bosch GmbH,
Vector Informatik GmbH,
ZF Friedrichshafen AG.

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2-1. Preliminary Check of the Usefulness of CERP

Try to define the Toyota's parameter checklists by using CERP format

: Yes (12/22) : Complicate, but Yes (3/22) : No (7/22)

Category	No	Function	Status
Equality	1-1	VALUE == VALUE	
	1-2	CURVE == CURVE, MAP == MAP, CUBOID == CUBOID	
	1-3	VAL_BLK == VAL_BLK	
Comparison	2-1	VALUE > VALUE	
	2-2	CURVE > CURVE, MAP > MAP, CUBOID > CUBOID	
	2-3	VAL_BLK > VAL_BLK	
	2.4	CURVE > VALUE, MAP > VALUE, CUBOID > VALUE	
Taking values	3.1	CURVE(x), MAP(x,y), CUBOID(x,y,z)	
	3.2	CURVE[m], MAP[m,n], CUBOID[m,n,o]	
	3.3	CURVE[END], MAP[END,END], CUBOID[END,END,END]	

Category	No	Function	Status
Taking Value	3-4	MAP(x,:), MAP(:,y), CUBOID(x,y,:), CUBOID(x,:,:)	
	3-5	MAP[m,:], CUBOID[m,n,:], CUBOID[m,:,:]	
	3-6	VAL_BLK[m], VAL_BLK[m,n]	
	3-7	XAXIS(CURVE), YAXIS(MAP), ZAXIS(CUBOID)	
	3-8	XAXIS(CURVE)[n], YAXIS(MAP)[n], ZAXIS(CUBOID)[n]	
	3-9	MAX(v1, v2, ···), MIN(v1, v2, ···)	
	3-10	UPPER(AXIS, v), LOWER(AXIS, v)	
Defining values	4-1	CURVE, MAP, VAL_BLK	
Comparison	5-1	Four arithmetic operations (+, -, *, /)	
	5-2	Combination of functions	
Check conditions	6-1	if-elif-else	
	6-2	&&, ||	

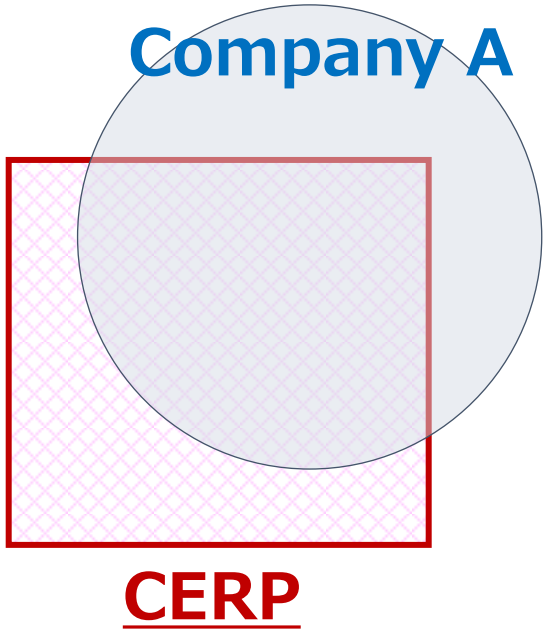
At the time decision

Cannot define equality and magnitude relation between MAPs
→ Shelve the application of CERP standard

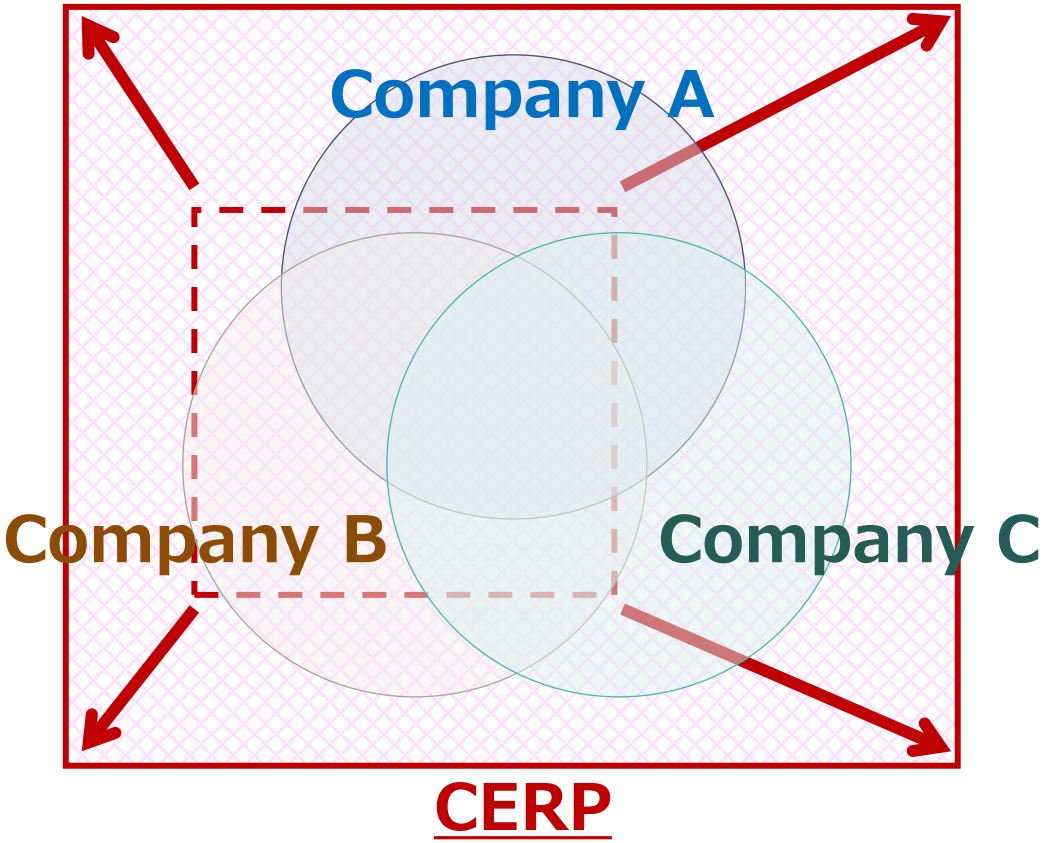
2-2. CERP Application to Actual Vehicle Development

Need more extension to use CERP standard on actual vehicle development

Current version



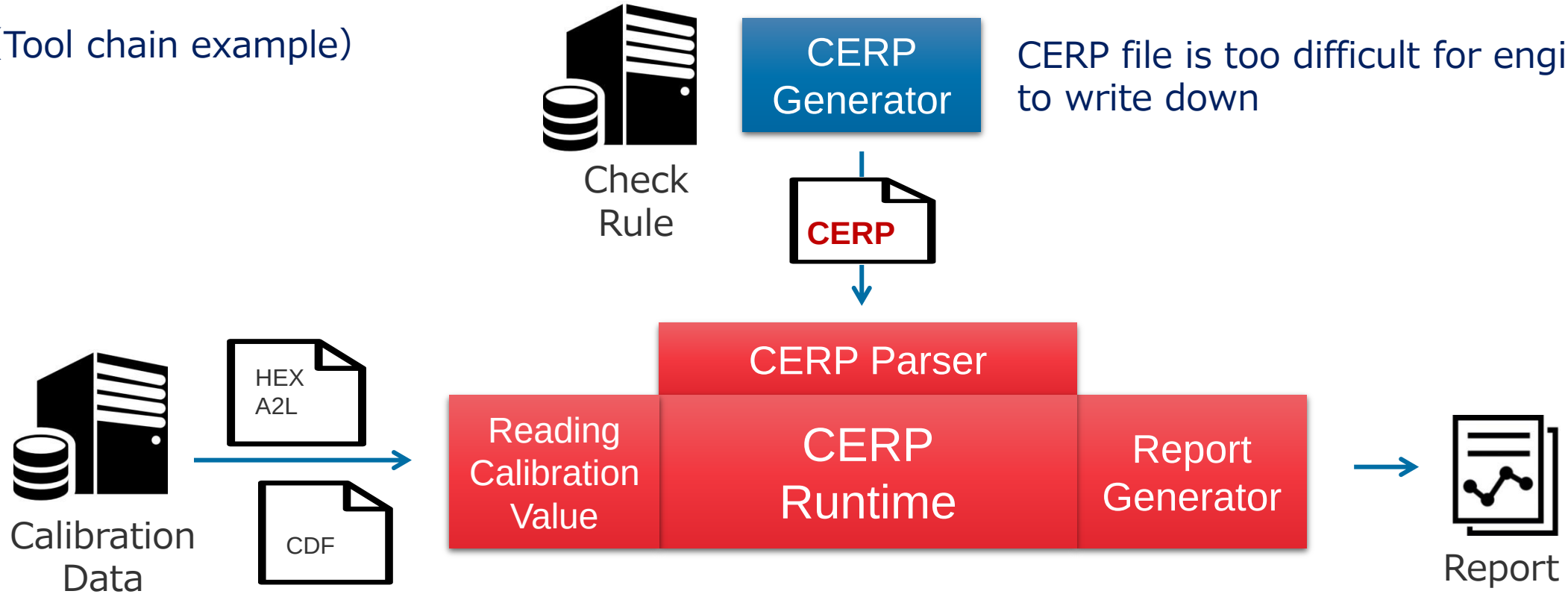
Future version



2-3. CERP Compliant Product

So far, no CERP-compliant commercial product
→ expectation to Tool Vendors

(Tool chain example)



Beyond OEM's in-house development

2-4. Purpose and Goal of CERP Study Group

Purpose

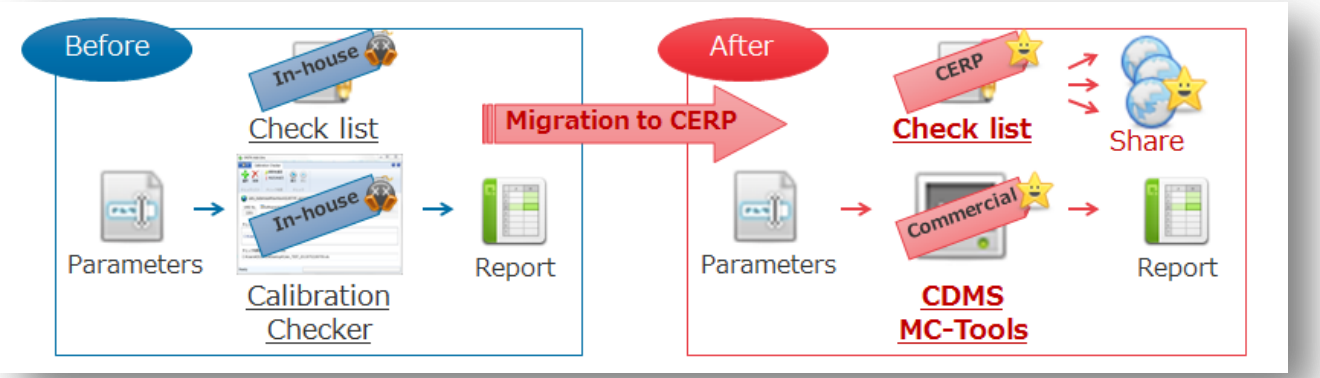
- Understand the CERP standard
- Study the usability of calibration parameter check

Goal

- Judge the usability of CERP
- Make the project proposal, if needed

Moreover

- Mutual understanding and exchanging among OEMs
- Deliver message to tool vendors and expectation of commercial product



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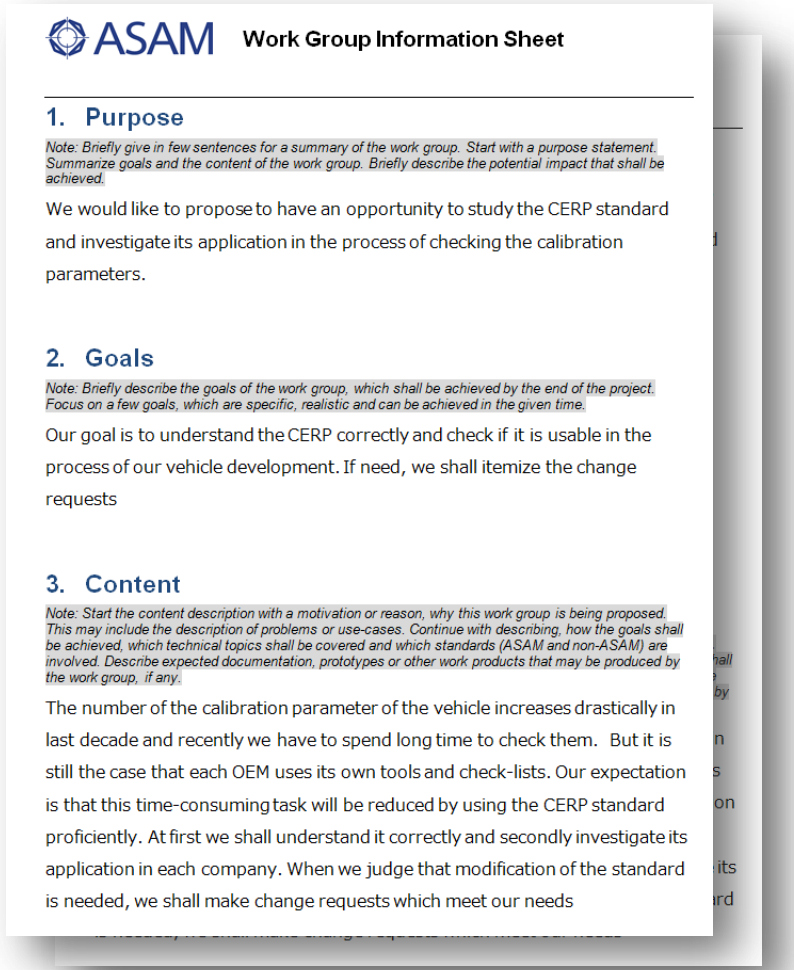
3-1. Preparation of CERP Study Group

<Work Group Information Sheet>



ASAM **Work Group Information Sheet**

1. Purpose

Note: Briefly give in few sentences for a summary of the work group. Start with a purpose statement. Summarize goals and the content of the work group. Briefly describe the potential impact that shall be achieved.

We would like to propose to have an opportunity to study the CERP standard and investigate its application in the process of checking the calibration parameters.

2. Goals

Note: Briefly describe the goals of the work group, which shall be achieved by the end of the project. Focus on a few goals, which are specific, realistic and can be achieved in the given time.

Our goal is to understand the CERP correctly and check if it is usable in the process of our vehicle development. If need, we shall itemize the change requests

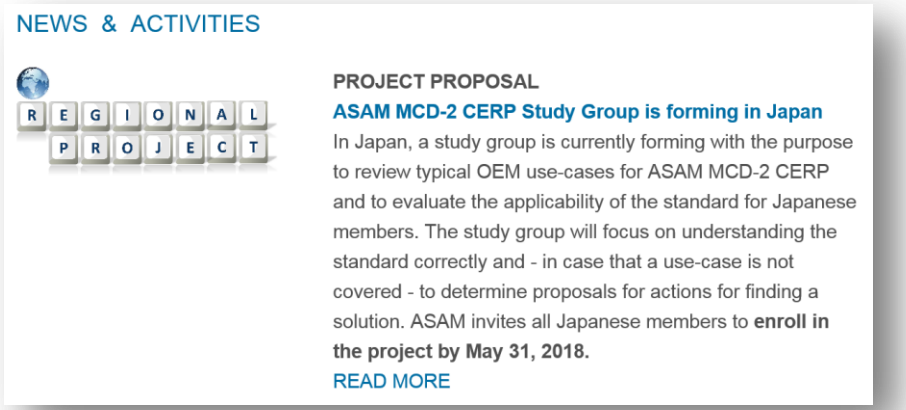
3. Content

Note: Start the content description with a motivation or reason, why this work group is being proposed. This may include the description of problems or use-cases. Continue with describing, how the goals shall be achieved, which technical topics shall be covered and which standards (ASAM and non-ASAM) are involved. Describe expected documentation, prototypes or other work products that may be produced by the work group, if any.

The number of the calibration parameter of the vehicle increases drastically in last decade and recently we have to spend long time to check them. But it is still the case that each OEM uses its own tools and check-lists. Our expectation is that this time-consuming task will be reduced by using the CERP standard proficiently. At first we shall understand it correctly and secondly investigate its application in each company. When we judge that modification of the standard is needed, we shall make change requests which meet our needs

<Member Application>

(e-mail)



NEWS & ACTIVITIES

REGIONAL PROJECT

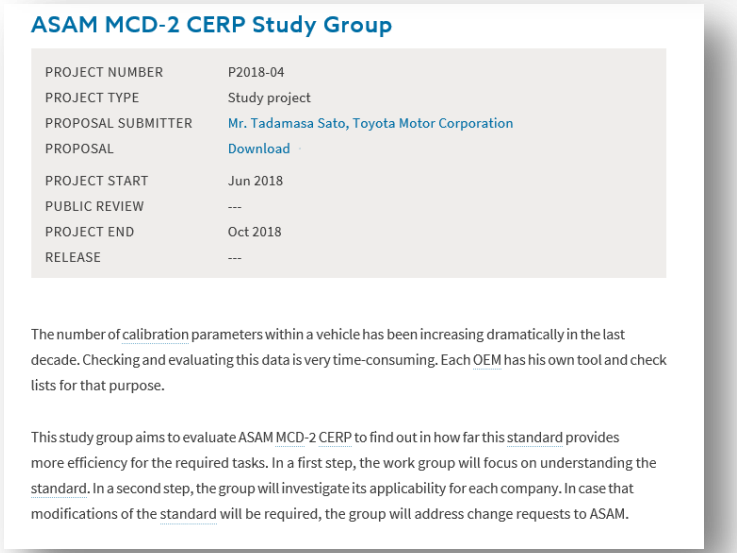
PROJECT PROPOSAL

ASAM MCD-2 CERP Study Group is forming in Japan

In Japan, a study group is currently forming with the purpose to review typical OEM use-cases for ASAM MCD-2 CERP and to evaluate the applicability of the standard for Japanese members. The study group will focus on understanding the standard correctly and - in case that a use-case is not covered - to determine proposals for actions for finding a solution. ASAM invites all Japanese members to **enroll in the project by May 31, 2018.**

READ MORE

(HP)



ASAM MCD-2 CERP Study Group

PROJECT NUMBER	P2018-04
PROJECT TYPE	Study project
PROPOSAL SUBMITTER	Mr. Tadamasa Sato, Toyota Motor Corporation
PROPOSAL	Download
PROJECT START	Jun 2018
PUBLIC REVIEW	---
PROJECT END	Oct 2018
RELEASE	---

The number of calibration parameters within a vehicle has been increasing dramatically in the last decade. Checking and evaluating this data is very time-consuming. Each OEM has his own tool and check lists for that purpose.

This study group aims to evaluate ASAM MCD-2 CERP to find out in how far this standard provides more efficiency for the required tasks. In a first step, the work group will focus on understanding the standard. In a second step, the group will investigate its applicability for each company. In case that modifications of the standard will be required, the group will address change requests to ASAM.

3-2. Member of Study Group

- 6 people (4 OEMs)
- 8 people (5 Tool Vendors)

AVL

Takehiro Esaka

SUBARU

Eiki Nobuhira

TOYO Corporation

Masumi Okada

ETAS

Fumiaki Sasaki　Yoshinori Nishi

TOYOTA

Katsuhiro Miyoshi　Tadamasa Sato

HINO

Masaya Fukuda　Yoshihiro Tagami

TTDC

Takahiro Kondoh　Takemi koizumi

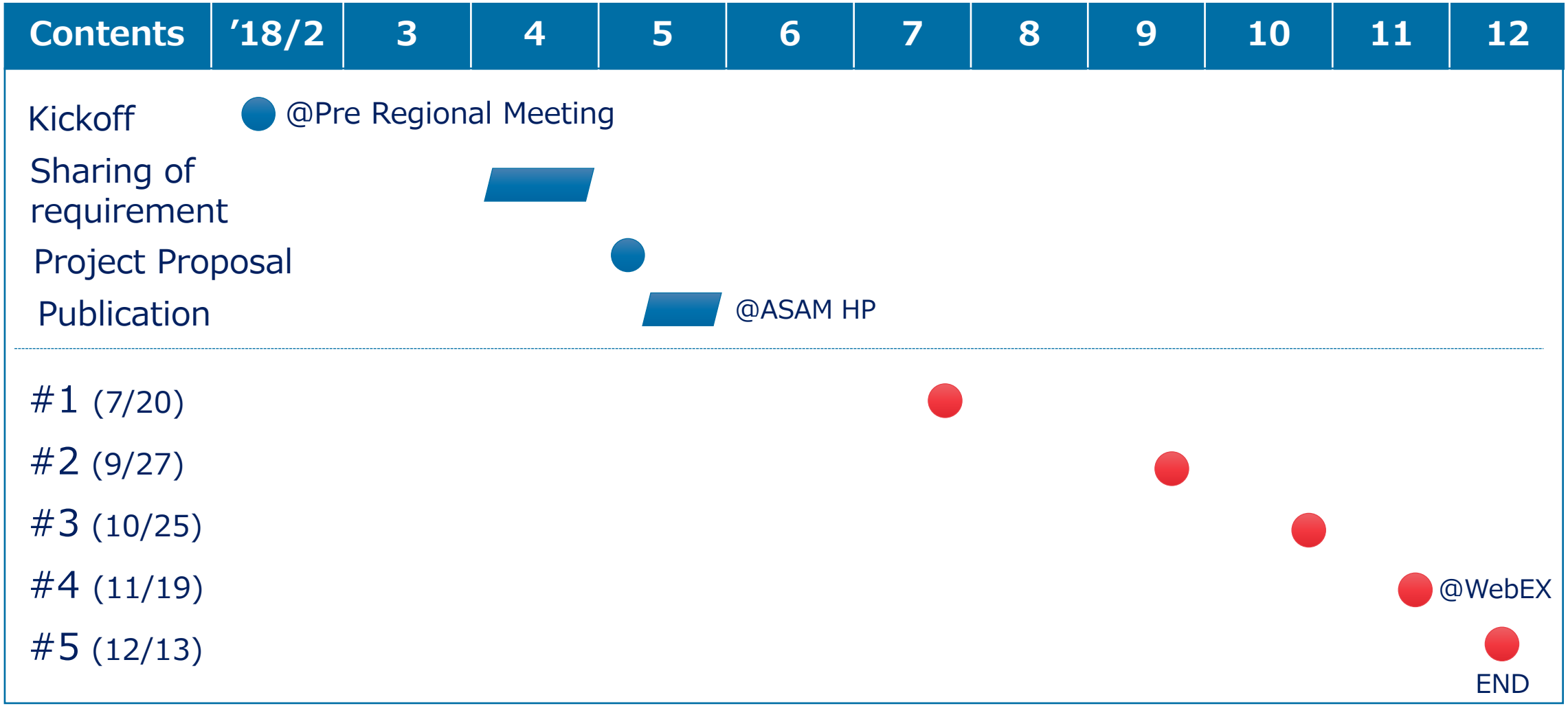
HONDA
The Power of Dreams

Hiroshi Samezawa

VECTOR

André Steimel　Tomomi Ebisu

3-3. Schedule



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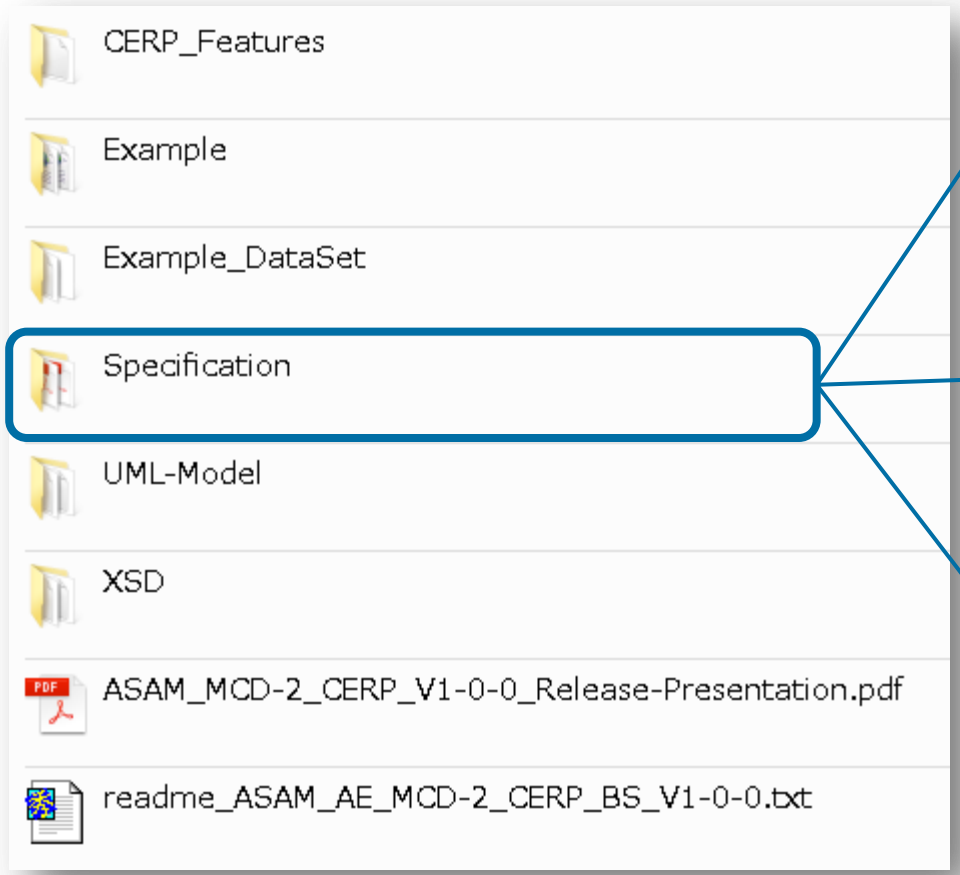
3-4. Activity

No.	Contents	Date/Time
#1	**MCD-2 CERP standard study** ～What kind of standard is the CERP ?～	7/20 13:00-18:00
#2	**Read through the CERP standard +** **Share the parameter check methods of each OEM** ～Collect all checklists of OEMs～	9/27 11:00-18:00
#3	**Verify the usability of current CERP standard for all check methods of Japanese OEMs** ～Know the concrete CERP description～	10/25 13:00-18:00
#4	**Change requests** ～Collect the check functions which Group members need and summarize its description～	11/19(WebEx) 15:00-17:00
#5	**Final check of the Change requests** **Confirmation of the CERP-compliant product of each Tool Vendor, Wrap up and future activity**	12/13 13:00-18:00

3-5. Translation and Read-Through of CERP ①

Standard Constitution

- CERP has 3 specifications



Read-Through

①User's Guide
Guide of standard and use-cases

ASAM_AE_MCD-2_CERP_BS-1-2-User-Guide_V1-0-0.pdf

②Reference Guide
(Execution, Condition, Process)

ASAM_AE_MCD-2_CERP_BS-2-2-Reference-Guide_V1-0-0.pdf

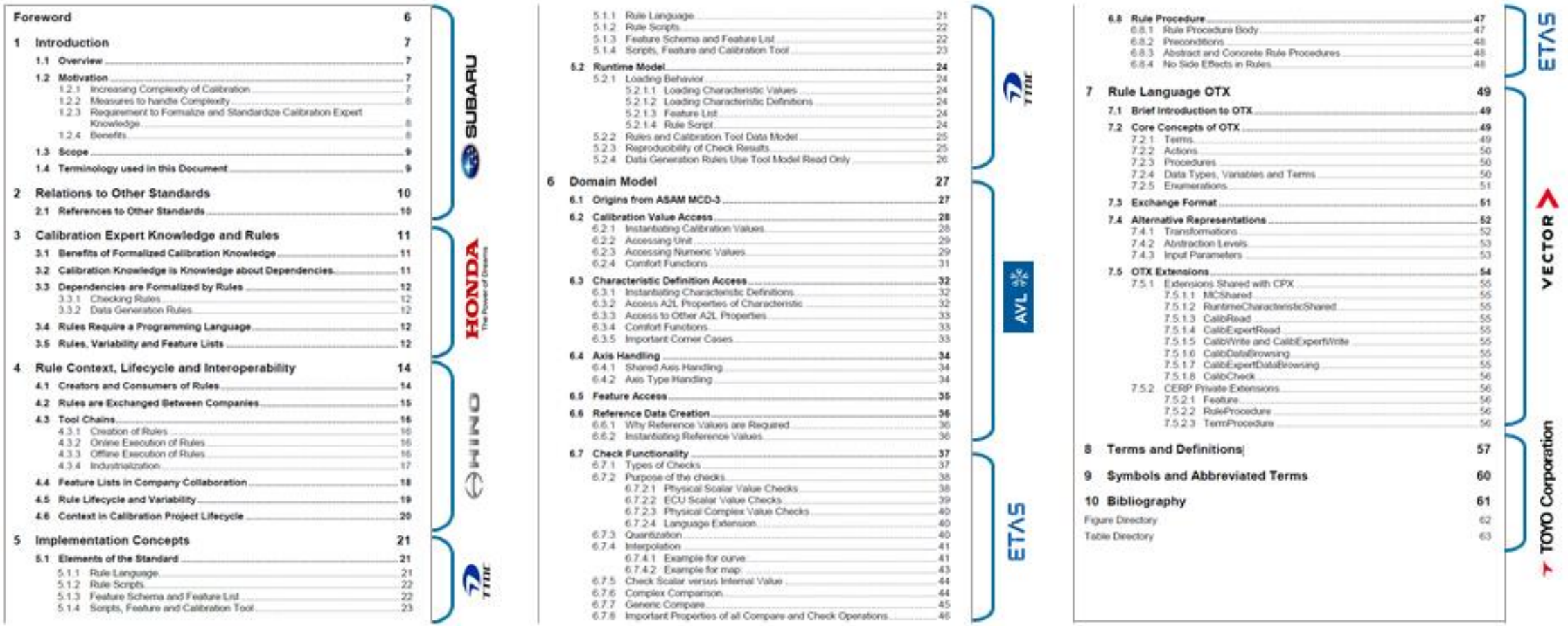
③Detail Reference Guide
Common guide of CPX and CERP

ASAM_AE_CERP-CPX_BS_CalibExtensionInterfaceDefinition_V1-0-0.pdf

3-5. Translation and Read-Through of CERP ②

Japanese translation by all members

- 10 Chapters (64 pages)



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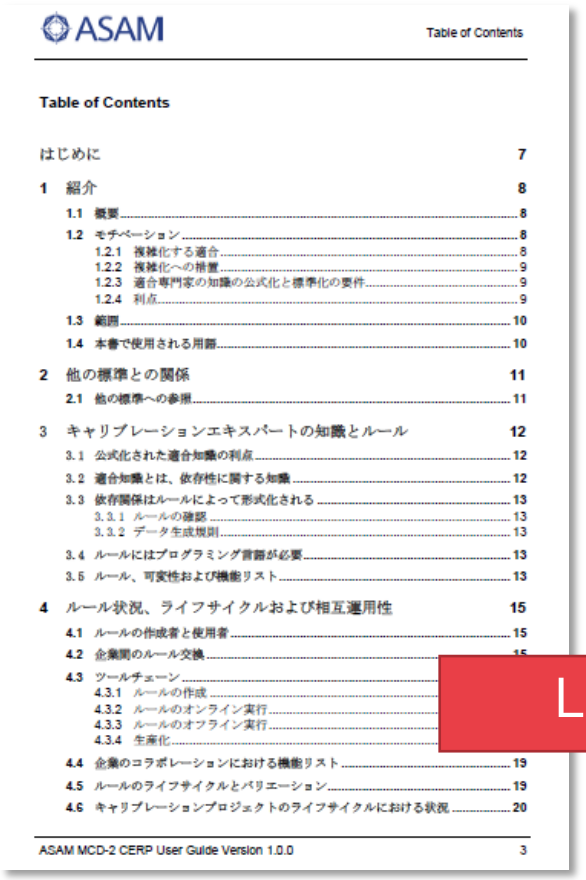
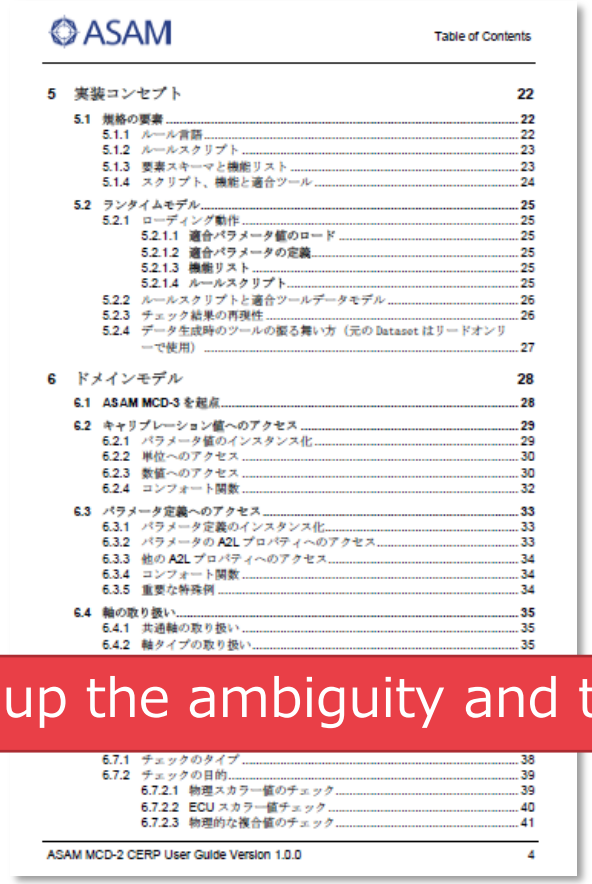
3-5. Translation and Read-Through of CERP ③

Japanese translation

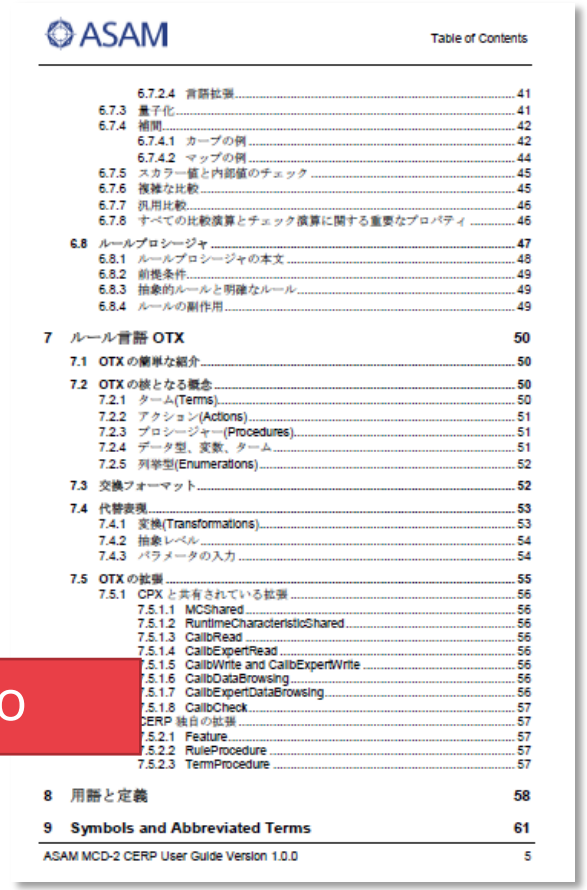
- Common understanding by read-through

Japanese translation





List up the ambiguity and typo



3-6. Share Use-cases ①　～List up check functions～

Collect the OEM's check methods of calibration parameters

- List up the functions which match the parameter check methods

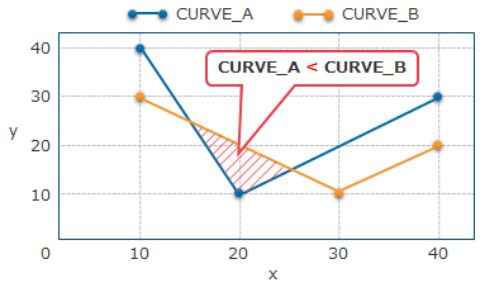
<List of check functions>

Category	No.	Function	Page
Equality (==, !=)	1-1	VALUE == VALUE	4
	1-2	CURVE == CURVE, MAP == MAP, CUBOID == CUBOID	5
	1-3	VAL_BLK == VAL_BLK	6
Comparison (>, >=, <, <=)	2-1	VALUE > VALUE	7
	2-2	CURVE > CURVE, MAP > MAP, CUBOID > CUBOID	8
	2-3	VAL_BLK > VAL_BLK	9
	2-4	CURVE > VALUE, MAP > VALUE, CUBOID > VALUE	10
Taking values	3-1	CURVE(x), MAP(x, y), CUBOID(x, y, z)	11
	3-2	CURVE[m], MAP[m, n], CUBOID[m, n, o]	12
	3-3	CURVE[END], MAP[END, END], CUBOID[END, END, END]	13
	3-4	MAP(x, :), MAP(:, y), CUBOID(x, y, :), CUBOID(x, :, :)	14
	3-5	MAP[m, :], CUBOID[m, n, :], CUBOID[m, :, :]	15
	3-6	VAL_BLK[m], VAL_BLK[m, n]	16
	3-7	XAXIS(CURVE), YAXIS(MAP), ZAXIS(CUBOID)	17
	3-8	XAXIS(CURVE)[n], YAXIS(MAP)[n], ZAXIS(CUBOID)[n]	18
	3-9	MAX(v1, v2, ···), MIN(v1, v2, ···)	19
	3-10	UPPER(AXIS, v), LOWER(AXIS, v)	20

<Detail description of each check function>

2-2. CURVE > CURVE, MAP > MAP, CUBOID > CUBOID

Description	Whether a characteristic of A is bigger than B(A > B). In additional, A >= B, A < B, A <= B. Parameter types of A and B are "CURVE", "MAP" or "CUBOID". If number of element is not match between A and B, calculate value with linear interpolation method.
Example	Value: CURVE_A = x: 10, 20, 40 / y: 40, 10, 30 CURVE_B = x: 10, 30, 40 / y: 30, 10, 20 Function: CURVE_A >= CURVE_B Result: False



ASAM

3-6. Share Use-cases ②　～List up check functions～

List of check functions

Check functions
29 types

Equality

Comparison

Taking Values

Category	No.	Function	Page
Equality (==, !=)	1-1	VALUE == VALUE	4
	1-2	CURVE == CURVE, MAP == MAP, CUBOID == CUBOID	5
	1-3	VAL_BLK == VAL_BLK	6
Comparison (>, >=, <, <=)	2-1	VALUE > VALUE	7
	2-2	CURVE > CURVE, MAP > MAP, CUBOID > CUBOID	8
	2-3	VAL_BLK > VAL_BLK	9
	2-4	CURVE > VALUE, MAP > VALUE, CUBOID > VALUE	10
Taking values	3-1	CURVE(x), MAP(x, y), CUBOID(x, y, z)	11

Category	No.	Function	Page
Defining values	4-1	CURVE, MAP, VAL_BLK	23
Calculating values	5-1	Four arithmetic operations (+, -, *, /)	23
	5-2	Bit mask operations (&, |, ^)	23
	5-3	Remainder operation (%)	25
	5-4	Bit shift operations (>>, <<)	25
	5-5	Combination of functions	26
Check conditions	6-1	if–elif-else	28
	6-2	&&, ||	28
	6-3	!	29
Calculating complex values	7-1	Monotonically increasing	30
	7-2	Allowable of deviation	31
	7-3	Detect abnormal step	32

Defining Values

Calculating

Condition

Complex Calculating

ASAM

3-6. Share Use-cases ③　～List up check functions～

Detail description of each check function（MAP's magnitude relation）

Description	Whether a characteristic of A is bigger than B(A > B). In additional, A >= B, A < B, A <= B. Parameter types of A and B are "CURVE", "MAP" or "CUBOID". If number of element is not match between A and B, calculate value with linear interpolation method.

Example

Value:

CURVE_A =

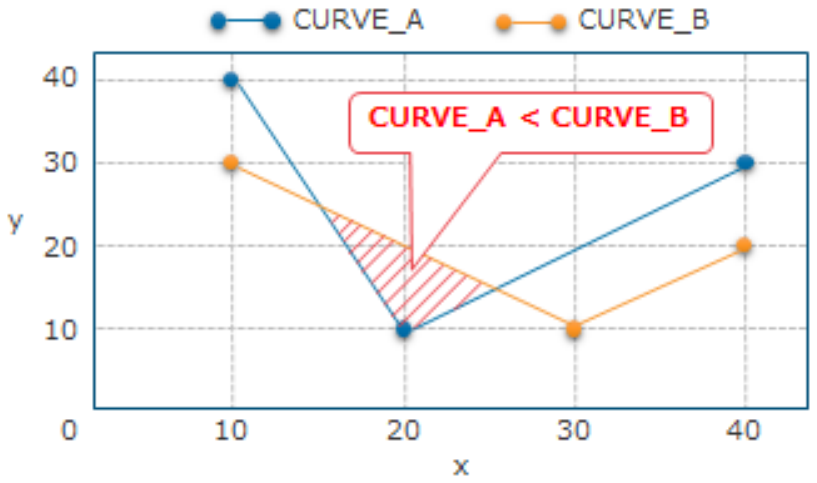
x	10	20	40
y	40	10	30

CURVE_B =

x	10	30	40
y	30	10	20

Function:

CURVE_A >= CURVE_B



Result:

False

Explain function

Define values

Example

Result

ASAM

3-7. Can CERP Handle Our Check Functions ?

Check whether current CERP can describe our check functions

: Yes (16/29)

: Complicate, but Yes (3/29)

: No (10/29)

Category	No.	Function	Status
Equality (==, !=)	1-1	VALUE == VALUE	
	1-2	CURVE == CURVE, MAP == MAP, CUBOID == CUBOID	
	1-3	VAL_BLK == VAL_BLK	
Comparison (>, >=, <, <=)	2-1	VALUE > VALUE	
	2-2	CURVE > CURVE, MAP > MAP, CUBOID > CUBOID	
	2-3	VAL_BLK > VAL_BLK	
	2-4	CURVE > VALUE, MAP > VALUE, CUBOID > VALUE	
Taking values	3-1	CURVE(x), MAP(x, y), CUBOID(x, y, z)	
	3-2	CURVE[m], MAP[m, n], CUBOID[m, n, o]	
	3-3	CURVE[END], MAP[END, END], CUBOID[END, END, END]	
	3-4	MAP(x, :), MAP(:, y), CUBOID(x, y, :), CUBOID(x, :, :)	
	3-5	MAP[m, :], CUBOID[m, n, :], CUBOID[m, :, :]	
	3-6	VAL_BLK[m], VAL_BLK[m, n]	
	3-7	XAXIS(CURVE), YAXIS(MAP), ZAXIS(CUBOID)	
	3-8	XAXIS(CURVE)[n], YAXIS(MAP)[n], ZAXIS(CUBOID)[n]	
	3-9	MAX(v1, v2, ···), MIN(v1, v2, ···)	
	3-10	UPPER(AXIS, v), LOWER(AXIS, v)	

Category	No.	Function	Status
Defining values	4-1	CURVE, MAP, VAL_BLK	
Calculating values	5-1	Four arithmetic operations (+, -, *, /)	
	5-2	Bit mask operations (&, |, ^)	
	5-3	Remainder operation (%)	
	5-4	Bit shift operations (>>, <<)	
	5-5	Combination of functions	
Check conditions	6-1	if–elif-else	
	6-2	&&, ||	
	6-3	!	
Calculating complex values	7-1	Monotonically increasing	
	7-2	Allowable of deviation	
	7-3	Detect abnormal step	

Add our check functions in CERP standard

3-8. Submission of Change Request ①

Request to modify five(5) writing sentences

1-1. Correction of the typo (”archived” → “achieved”)

Title	Correction of the typo error (”archived” → “achieved”)
Content	【Chapter No.】 1.2.2 Measures to handle Complexity 【Current】 • Calibration tasks focus on the functionality to be **archived**, not on the isolated adaptation of single characteristics. This abstraction of calibration is also called functional calibration. 【Revision】 • Calibration tasks focus on the functionality to be **achieved**, not on the isolated adaptation of single characteristics. This abstraction of calibration is also called functional calibration.

Typo

1-2. Easy-to-understand word (”empiric” → “practical”)

Title	Easy-to-understand word (”empiric” → “practical”)
Content	【Chapter No.】 4.1 Measures to handle Complexity 【Current】 • Rules are created by designers of the ECU or control algorithm (ECU, function, hardware developers). Calibrators contribute knowledge from experience or **empiric** experiments 【Revision】 • Rules are created by designers of the ECU or control algorithm (ECU, function, hardware developers). Calibrators contribute knowledge from experience or **practical** experiments

Easier word

1-3. Easy-to-understand chapter title

Title	Easy-to-understand chapter title
Content	【Chapter No.】 5.2.4 Data Generation Rules Use Tool Model Read Only 【Current】 • Data Generation Rules Use Tool Model Read Only 【Revision】 Chapter title is a kind of difficult to understand. We would like to request easier expression. For example, - Access control of the data model in the (calibration) tool. (Vector, Mr. Steimel's comment)

Easier sentence

1-4. Correction of the typo (”mapCharRef” → “mapChar”)

Title	Correction of the typo error (”mapCharRef” → “mapChar”)
Content	【Chapter No.】 6.7.6 Measures to handle Complexity 【Current】 Characteristic **mapChar** = CreateMapCharacteristic(Dim1AxisValues = xAxis, Dim1AxisUnit = "", Dim2AxisValues = yAxis, Dim2AxisUnit "Nm", CellValues = cell, CellValueUnit "ml/s") 【Revision】 Characteristic **mapChar** = CreateMapCharacteristic(Dim1AxisValues = xAxis, Dim1AxisUnit = "", Dim2AxisValues = yAxis, Dim2AxisUnit "Nm", CellValues = cell, CellValueUnit "ml/s") cIdentifier = idA , ue = **mapChar**, IgnoreEmpty)

Typo

1-5. Addition of the supplemental explanation

Title	Addition of the supplemental explanation (explanation of the colored boxes)
Content	【Chapter No.】 7.5 OTX Extensions 【Current】 We think that the explanation of Figure 17 is not enough. 【Revision】 We would like to request to add the supplemental explanation of Figure 17. (Vector, Mr. Steimel's comment)  Figure 17 Overview of relevant OTX extensions The blue triangle show extensions of the OTX data types. Orange, green, yellow boxes are basically functions. The only use data types of the core standard. In contrast, some CERP library also introduced new data types.

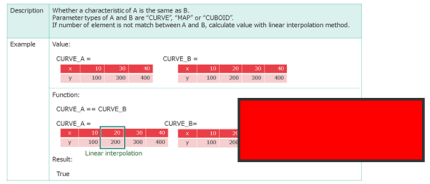
Supplemental explanation

3-8. Submission of Change Request ②

Request for new eleven(11) check functions

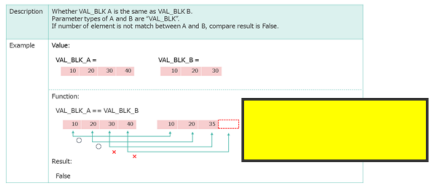
2-1. Function to check the equality between two maps

Title	Function to check the equality between two maps (CURVE , MAP, CUBOID, CUBE4, CUBE5) CURVE == CURVE, MAP == MAP, CUBOID == CUBOID, ···
Content	In the current version, we can check the equality between the map in the HEX/CDF and reference map in the check-list. But we can NOT check the equality between the maps in the HEX/CDF. We request to add this function.



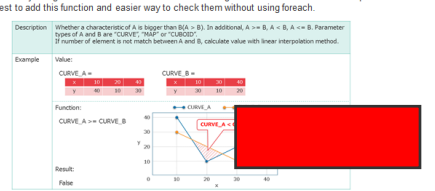
2-2. Function to check the equality between two tables

Title	Function to check the equality between two tables (VAL_BLK) VAL_BLK == VAL_BLK
Content	In the current version, we can check the equality between the table in the HEX/CDF and reference table in the check-list. But we can NOT check the equality between the tables in the HEX/CDF. We request to add this function.



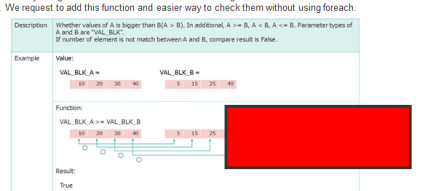
2-3. Function to check the magnitude relation between two maps

Title	Function to check the magnitude relation between two maps (CURVE , MAP, CUBOID, CUBE4, CUBE5) CURVE > CURVE, MAP > MAP, CUBOID > CUBOID, ···
Content	In the current version, we can check the magnitude relation between the map in the HEX/CDF and reference map in the check-list by using foreach. But we can NOT check the magnitude relation between the maps in the HEX/CDF. We request to add this function and easier way to check them without using foreach.



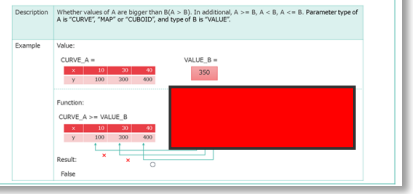
2-4. Function to check the magnitude relation between two tables

Title	Function to check the magnitude relation between two tables (VAL_BLK) VAL_BLK > VAL_BLK
Content	In the current version, we can check the magnitude relation between the table in the HEX/CDF and reference table in the check-list by using foreach. But we can NOT check the magnitude relation between the tables in the HEX/CDF. We request to add this function and easier way to check them without using foreach.



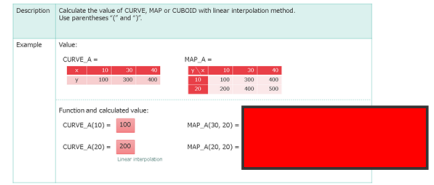
2-5. Function to check the magnitude relation between scalar value and map

Title	Function to check the magnitude relation between scalar value and map (CURVE , MAP, CUBOID, CUBE4, CUBE5) CURVE > VALUE, MAP > VALUE, CUBOID > VALUE, ···
Content	In the current version, we can check the magnitude relation between the scalar value/map in the HEX/CDF and reference scalar value/map in the check-list by using foreach. But we can NOT check the magnitude relation between the scalar values/maps in the HEX/CDF. We request to add this function and easier way to check them without using foreach.



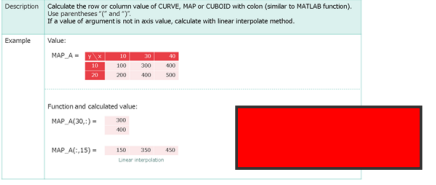
2-6. Interpolation of the map value

Title	Interpolation of the map value (CURVE , MAP, CUBOID, CUBE4, CUBE5) CURVE(x), MAP(x,y), CUBOID(x,y,z), ···
Content	In the current version, it is possible to calculate the interpolation of map value by specifying the arbitrary axis value. We would like to request to add this clearly in the standard description.



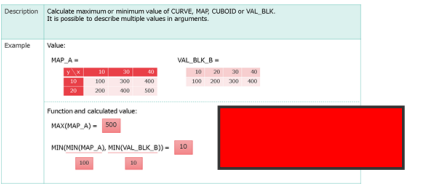
2-7. Add the colon operator which means “All of them”

Title	Add the colon operator which means “ANY” MAP(x,:), MAP(:,y), CUBOID(x,y,:), CUBOID(x,:,:), ···
Content	In the current version, it is not possible to get all row/column map values by specifying one axis or multiple axes. We would like to request this function which is colon operator in the MATLAB.



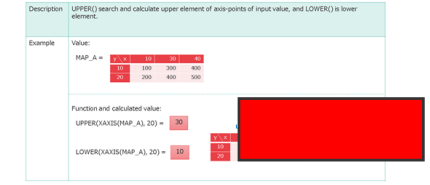
2-8. Function to return the max/min value

Title	Function to return the max/min value. MAX(v1, v2, ···), MIN(v1, v2, ···)
Content	In the current version, it is not possible to get the max/min value from the multiple scalar values, map values or table values. We would like to request this function.



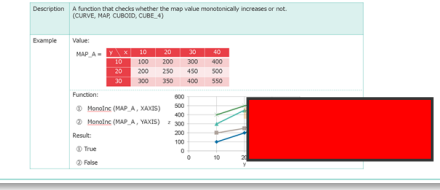
2-9. Function to return the neighboring upper/lower axis value of specified input value

Title	Function to return the neighboring upper/lower axis value of specified input value. UPPER(AXIS, v), LOWER(AXIS, v)
Content	The input value of axis is not always same as the axis value itself. And in the current version, it is not possible to get the neighboring upper/lower axis value of specified input value. We would like to request this function.



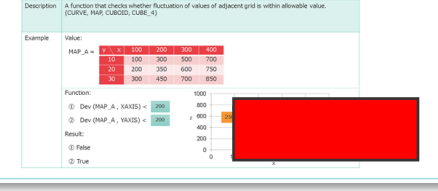
2-10. Check whether the map values are monotonically increasing

Title	Check whether the map values are monotonically increasing MonoInc (CURVE), MonoInc (MAP, YAXIS), MonoInc (CUBOID, ZAXIS), ···
Content	In the current version, it is not possible to check whether the map values are monotonically increasing or not. We would like to request this function. Moreover we need to check it in the direction of specific axis. In the case of MAP, we would like to check it in both X-axis or Y-axis.



2-11. Check the delta between adjacent map values

Title	Check the delta between adjacent map values Dev(CURVE) < v1, Dev (MAP, YAXIS) < v1, Dev (CUBOID, ZAXIS) < v1, ···
Content	In the current version, it is not possible to check whether the delta between adjacent map values is within acceptable range. We would like to request this function. Moreover we need to check them in the direction of specific axis. In the case of MAP, we would like to check it in both X-axis or Y-axis.



: Complicate, but Yes : 1

: No : 10

3-8. Submission of Change Request ③

Example of check function

(Check whether fluctuation of values of adjacent grid is within allowable value.)

Description	A function that checks whether fluctuation of values of adjacent grid is within allowable value. (CURVE, MAP, CUBOID, CUBE_4)
Example	Value:

MAP_A =

y \ x	100	200	300	400
10	100	300	500	700
20	200	350	600	750
30	300	450	700	850

Function:

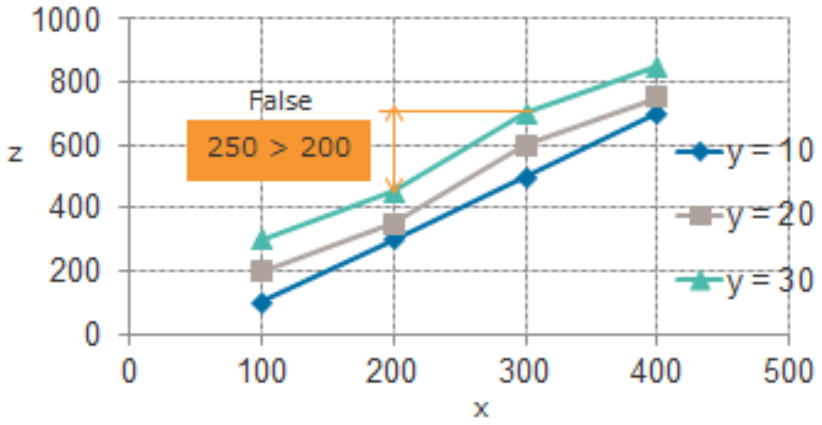
① Dev (MAP_A , XAXIS) < 200

② Dev (MAP_A , YAXIS) < 200

Result:

① False

② True



Explain function

Define values

Example

Result

ASAM

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4	**CERP規格と市販ツールへの期待** **Expectation to Commercial Product Compliant to CERP**
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6	Study Groupを終えて After CERP Study Group

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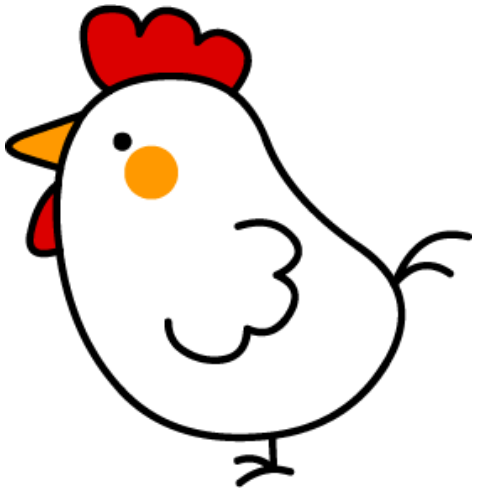
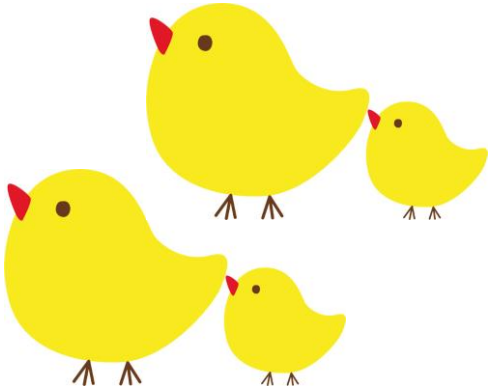
4-1. CERP Standard W/G For Our CRs

We are in a chicken-and-eggs situation

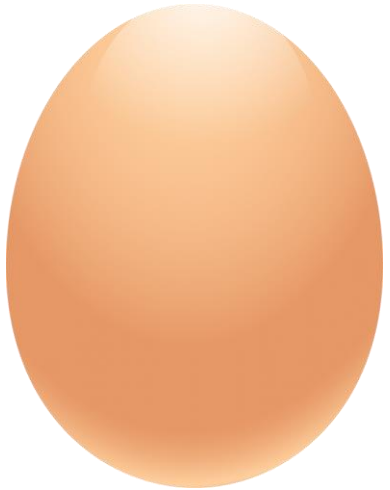
TOOL ?



NEEDs !



STANDARD ?



Now, hesitate to start the CERP standard W/G for our needs, because there is no plan of the commercial product

4-2. Future Advancement of CERP

(ASAM HP)

The current version (1.0.0)

the use-case of calibration **parameter checking.**

Now, parameter check

In the future version

to include the use-case of calibration **parameter calculation.**

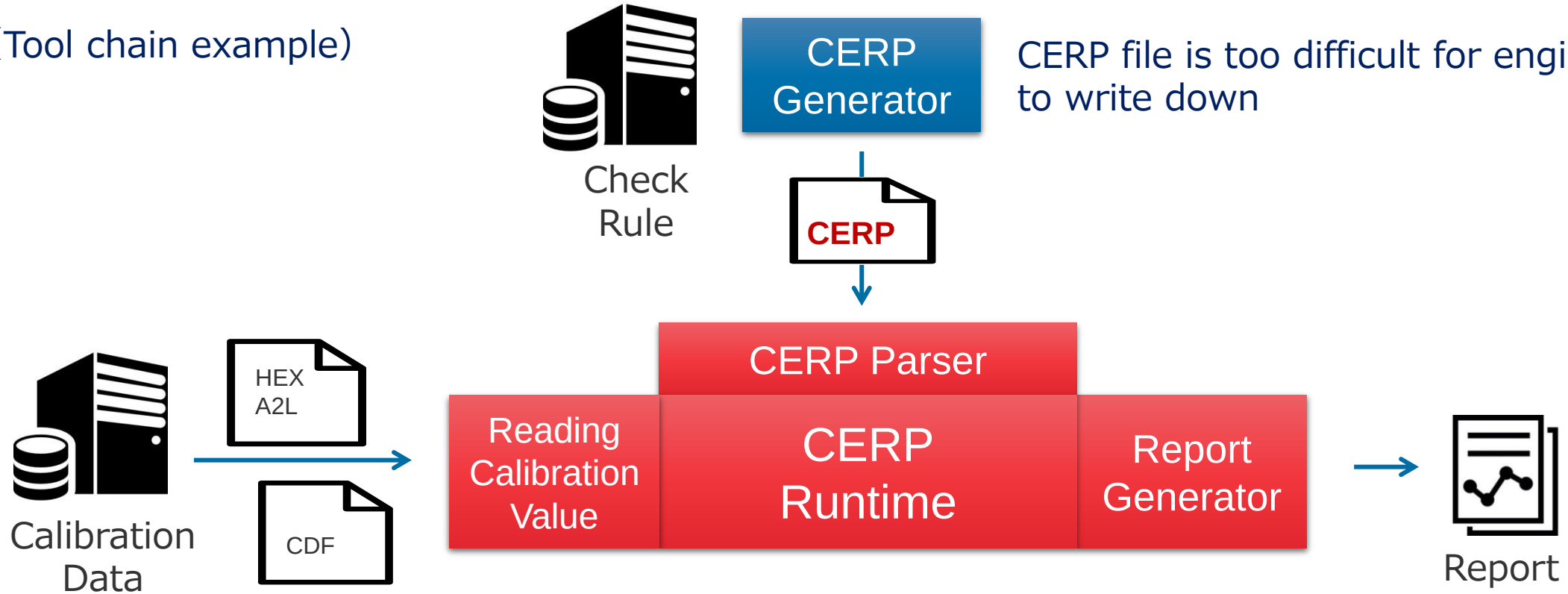
Future, parameter calculation !
We expect Future Advancement

4-3. Expectation to CERP Compliant Product

Again …

So far, no CERP-compliant commercial product
→ expectation to Tool Vendors

(Tool chain example)



Beyond OEM's in-house development

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6	Study Groupを終えて After CERP Study Group

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5-1. Warp Up

Through the CERP Study Group

- ✓ Accurately interpret and understand CERP
- ✓ Change request the ambiguity and typo of CERP
- ✓ Change request the check functions that match the OEM’s use-cases
- ✓ Commonly understand and share the OEM’s problems with Tool Vendors

Thirsting the CERP-compliant commercial products !

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6-1. メンバの感想①

初めてASAMのWGに参加させてもらった。難しい規格ではあったが、中身を理解でき良かった。
今後も継続して勉強していきたい。

ボヤッとした規格の内容がクリアになり、実用性を理解する事ができた。
今後の方向性もしっかり確認できた。

元々、適合していた時に定数のチェックは大変苦労していた。
若手が理解するのにとても良い機会だった。各社の状況を理解し、モチベーションが上がった。

初めてASAMのWGに参加させてもらい、定数チェックの必要性を良く理解できた。
同じように苦労している会社がある事がよく分かった。ベンダーの方に製品化を期待したい。

各社の内製チェック機能を見て、必要性がさらに高まった。今後の市販製品に期待。

適合の苦労は良く理解している。エキスパートは年々高齢化しており、益々ロジカルな検証が必要。
ツールのI/Fも含めて規格化されていくとさらに使えるものになっていく。

とても楽しい会だった。ASAMで沢山のOEM・ツールベンダーの方と繋がりを持つ事ができた。

6-1. メンバの感想②

各OEMの苦労を理解する事ができた。ツール側として協力していきたい。
日本から本国へ発信し、機能開発に繋げていきたい。

新人の勉強にも繋がる大変良い機会だった。本社と開発の方向性を議論して進めていきたい。

規格の機能を良く理解する事ができた。適合ツールを開発する側として、効率化をまだまだ図れる領域がある事を認識できた。大変勉強になった。

なんとなくイメージ的に理解していた規格だったが、和訳する事で、しっかり理解できた。
今後、ユースケースに基づいた話しを本国のデベロッパーと深く議論していく。

WGリーダー・メンバーの方々、ありがとうございました。WGがスムーズに進行しました。

ASAMの場で集まるとびっくりする程、各社の困り事は同じ。今後もこのような機会を持ち、日本の強化に繋げていきたい。

ASAMとWGメンバー全員に感謝します。ありがとうございました。

Thank you for your attention!

Tadamasa Sato

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