



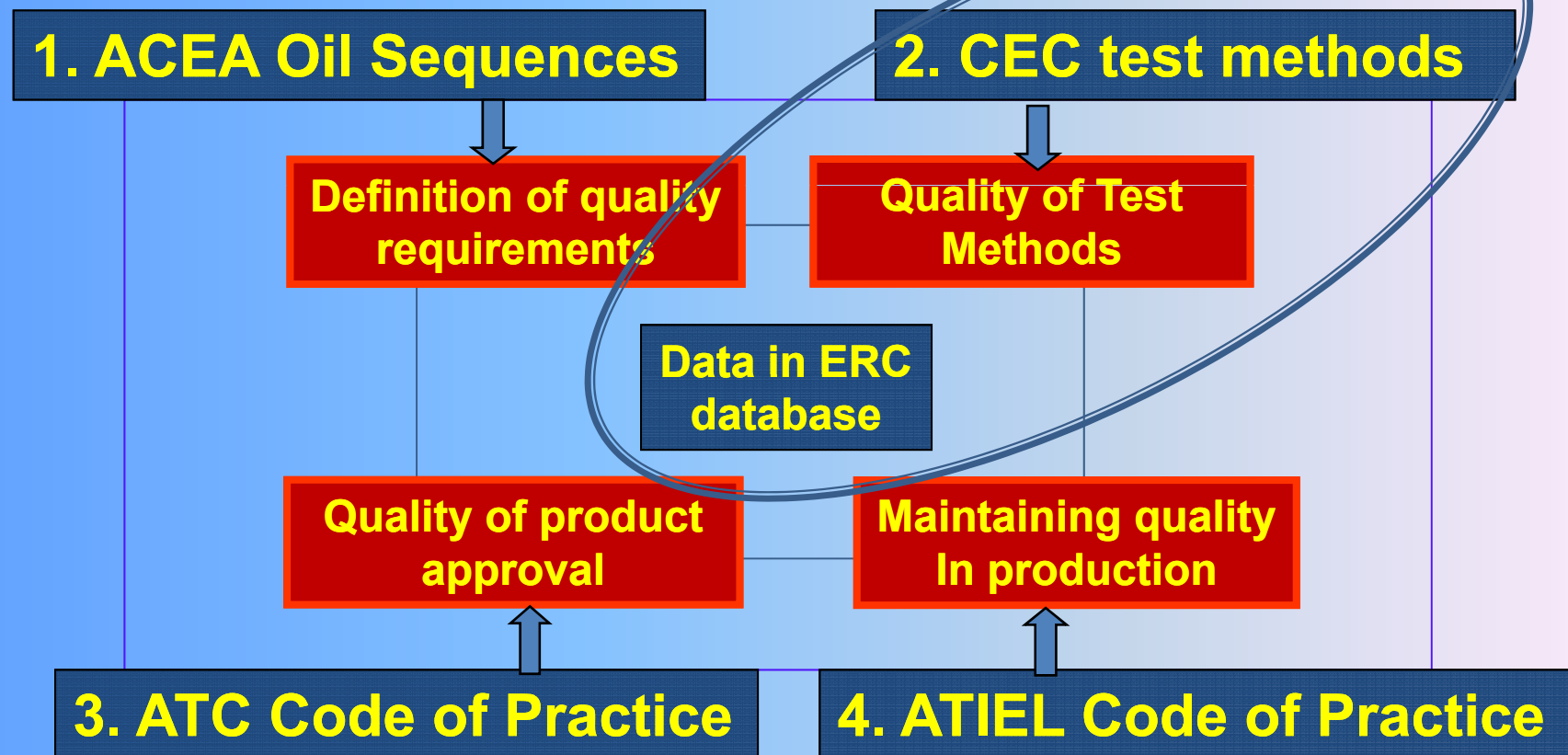
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for the Development of Performance Tests for Fuel, Lubricants and other Fluids

CEC Quality Systems

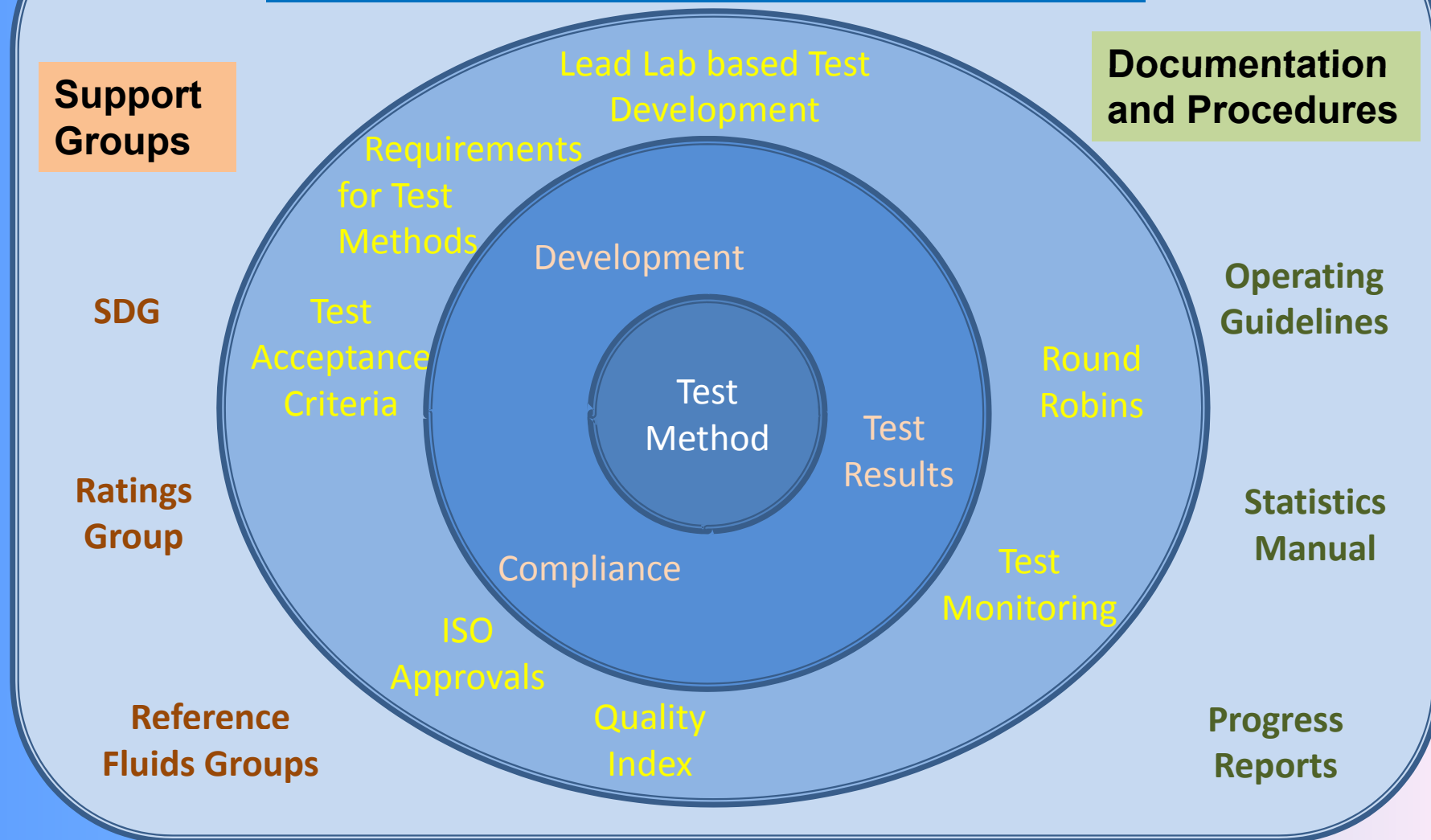


Dr Chris Gray, Infineum UK Ltd
Chairman of SDG.
21 November 2011

CEC's role in EELQMS



Elements of Quality in CEC



Elements of Quality in CEC

Support Groups

A comprehensive terms of reference document is put together by Industry Experts/ Management Board /OEMs so that the lead lab has good guidance on the test development.

Previously all labs participated at each round of testing - Expensive & little opportunity to optimise the test.

Now: the testing is restricted to one lab until there is evidence that the test meets the requirements.

Reference
Fluids Groups

Lead Lab based Test Development

Special test engines and hardware from CEC's OEM sponsors has tremendously helped improve quality, repeatability and test precision over the years

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SDG

Ratings Group

Reference Fluids Groups

Requirements for Test Methods

Test Acceptance Criteria

CEC test procedures are fully controlled documents and notifications of updates of sections are sent out to all holders by CEC Secretariat

Procedures must include Precision Statement and Referencing Protocol (typically 1 reference for 10 candidates)

Working to ensure that Precision Targets are included in all test methods.

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**Test
Acceptance
Criteria**

Previously based on DP/Delta which
could be distorted through use of
inappropriate reference fluids.

Now based on precision targets.

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ISO Approvals

As previously, CEC Test results used for checking conformance to an industry specification, must be obtained from a laboratory with ISO 9000 and ISO 17025 approvals.

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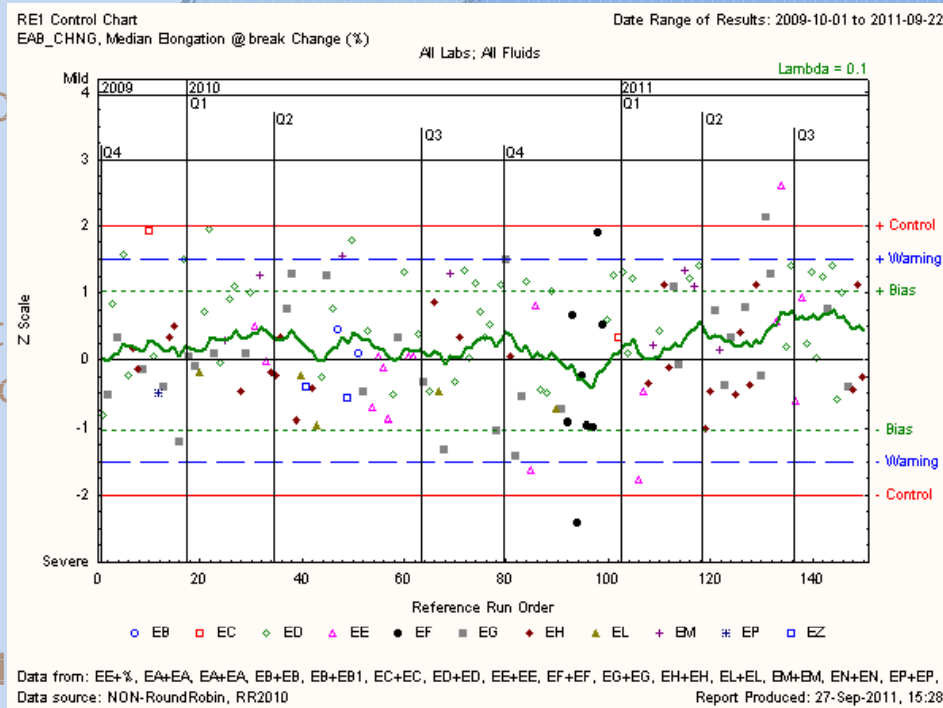
Elements of Quality in CEC

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Lead Lab based Test
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and Procedures

Comprehensive Test Monitoring System developed



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Lead Lab based Test Development

Requirements for Test

Round Robins continue to be run, where required, e.g. for test acceptance and reference fluid changes.

A consistent approach to the Statistical Analysis is effected via the continued development and use of the START software.

Best Practice has been clearly laid down in comprehensive statistical guidelines

New Analysis Techniques have been considered. E.g. Bayesian analysis where there are very few repeats.

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Vastly expanded to provide a consistent application of statistics across working groups

Recent changes introduce the idea of secondary parameters, including "no harm" parameters, suitable for safety limits

Best Practice introduced for introducing new reference fluids



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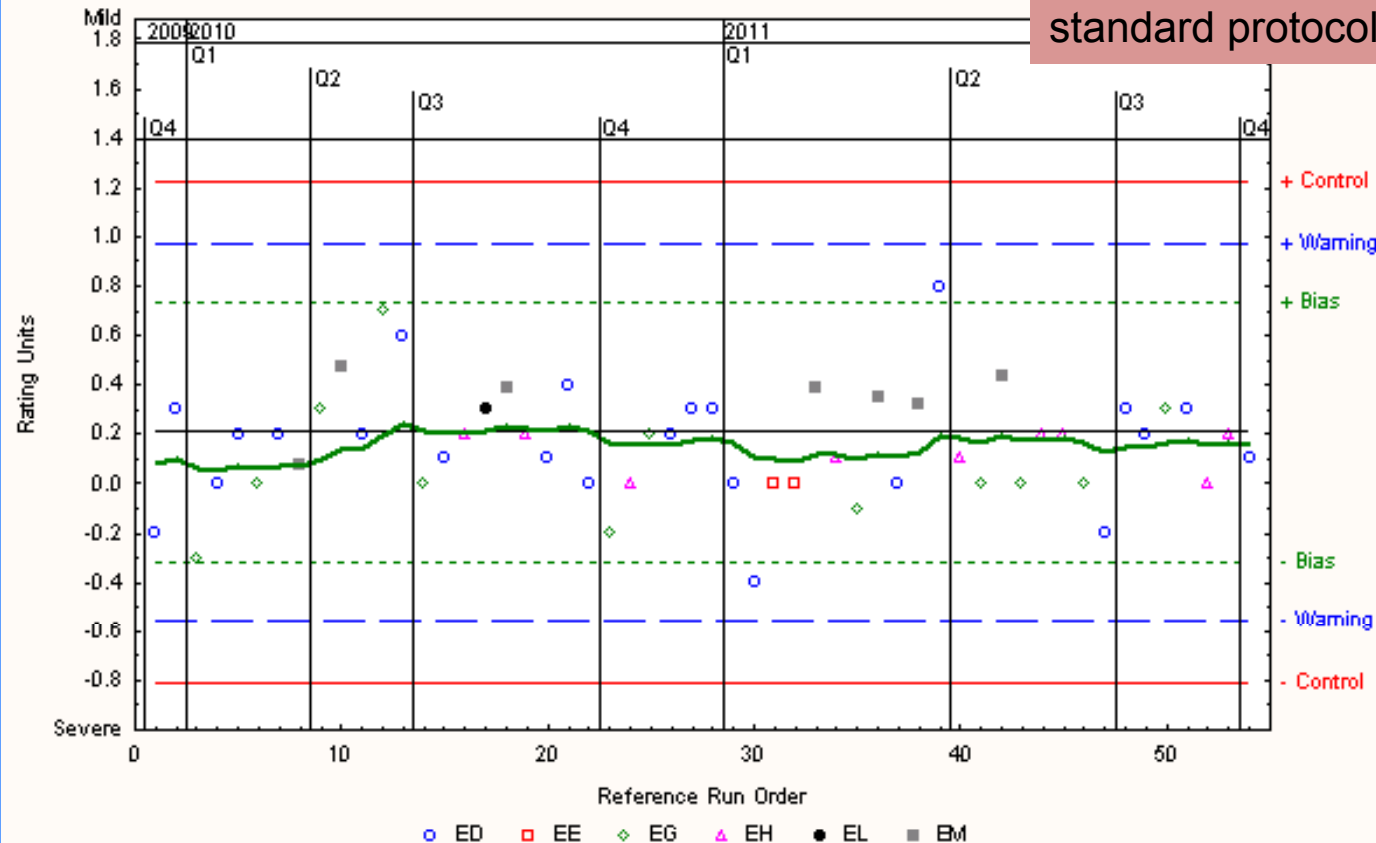
for the Development of Performance Tests for Fuel, Lubricants and other Fluids

Example of Test monitoring Chart

RE1 Control Chart
VOL_CHNG, Elastomer volume Change

Date Range of

All Labs; Batch=RL235+2



Data from: EE+%, EA+EA, EA+EA, EB+EB, EB+EB1, EC+EC, ED+ED, EE+EE, EF+EF, EG+EG, EH+EH, EL+EL, BM+BM, EN+EN, EP+EP, E
Data source: NON-RoundRobin, RR2010

Report Produced: 11-Oct-2011, 11:17

1 reference test
followed by 10
candidate tests is the
standard protocol

Benefits

Detects industry issues
more quickly

Helps stop candidates
being run when lab is
“out of control”

Reliable source of data
to the Working Group
for improving the test

Makes data visible to all
labs so all study it, and
contribute.

Provides a check that
labs are submitting
reference data



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Development of Test monitoring in CEC

1998

SDG introduce ideas. Applied mostly to engine tests



2003

CEC Management Board initiate pilot study for 3 bench tests



2005

Pilot successfully concluded. Extension to 7 more tests



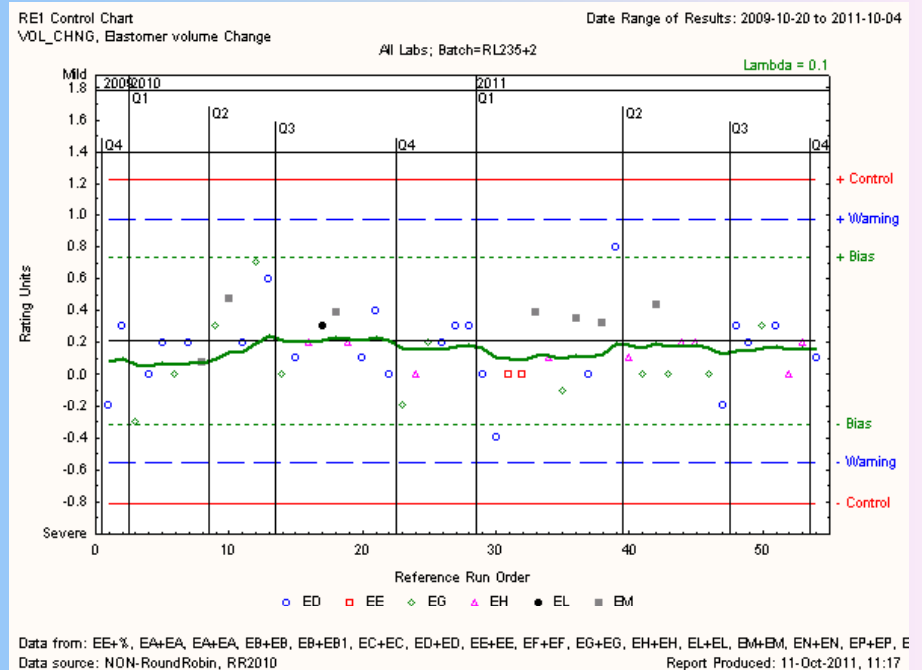
2008

Existing provider withdraws. System rebuilt from scratch by PDC. 10 tests active



2011

13 tests in system, or under development, >28000 results



Recent enhancements have concentrated on making it easier to enter data and tighter controls on data quality



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Development of ERC System

1996

System built for EEQLMS to contain both candidate and reference data



2003

Dynamic “on demand” reference charting introduced



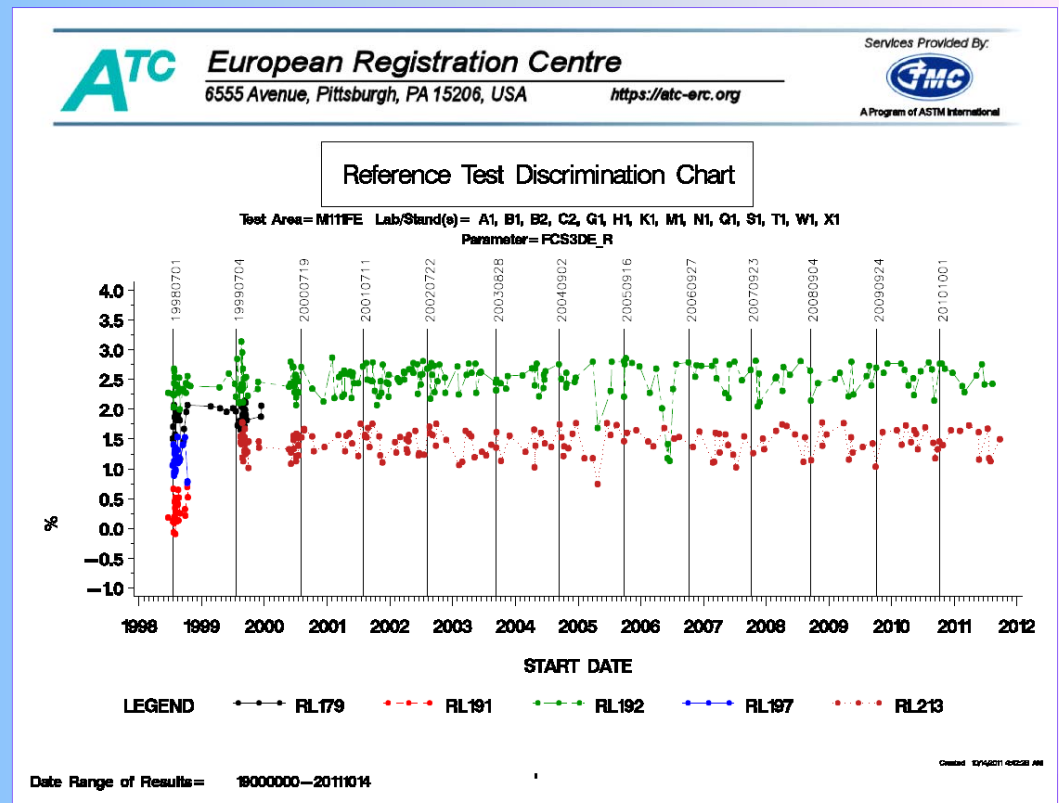
2007

Existing provider withdraws.
System rebuilt by TMC.

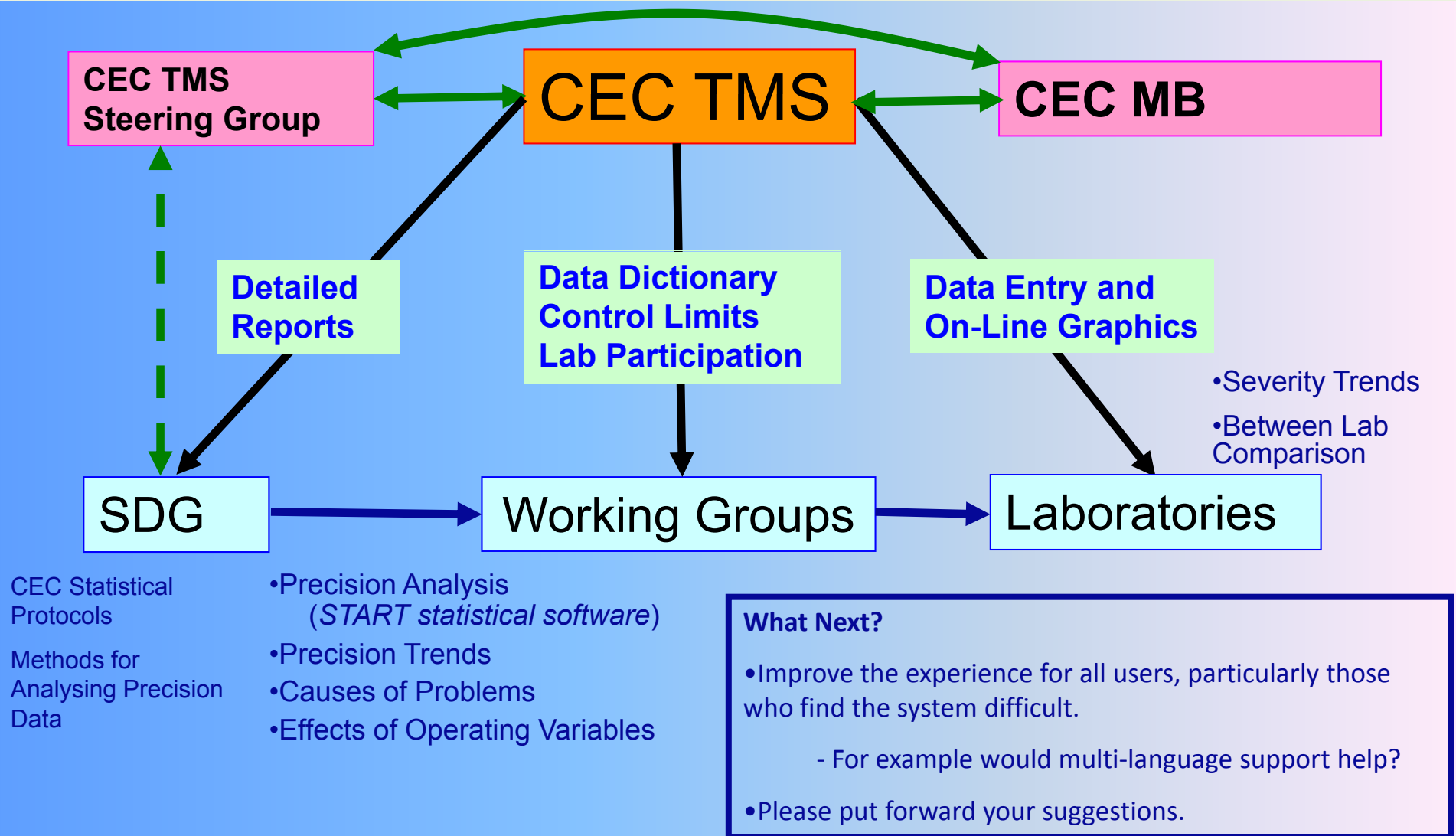


2011

7 Current tests use the system
Nearly 4000 reference oil results in system



Test Monitoring



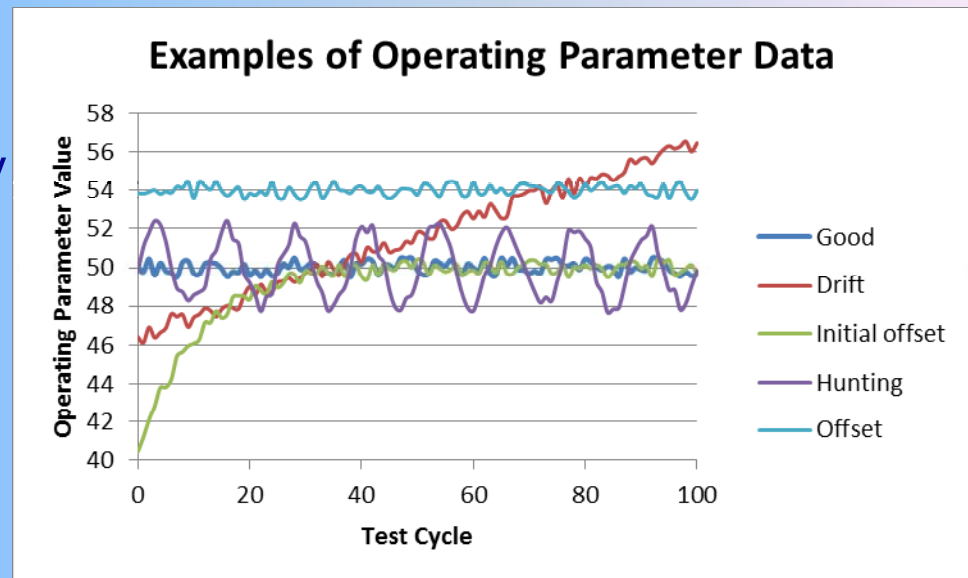
Quality Index

- The Quality Index is a set of measures describing how close the operational parameters stay to their target values

- Applicable to both reference runs and candidates
- Monitored throughout a test, allowing intervention by the operator
- Contributes to determining the Operational Validity of a test.

- Currently being developed for use in two fuels tests

- Comparison of operational data from different labs shows great scope for quality improvements.
- Helpful for developing a common understanding of the procedure.



Formalising the use of Secondary & “Safety” Parameters

A safety parameter could be one where most candidates using existing technology would be expected to pass, without necessarily any discrimination. This protects against novel technologies which might give a problem with this parameter.

ACEA include non-CEC approved “safety” parameters into their specifications

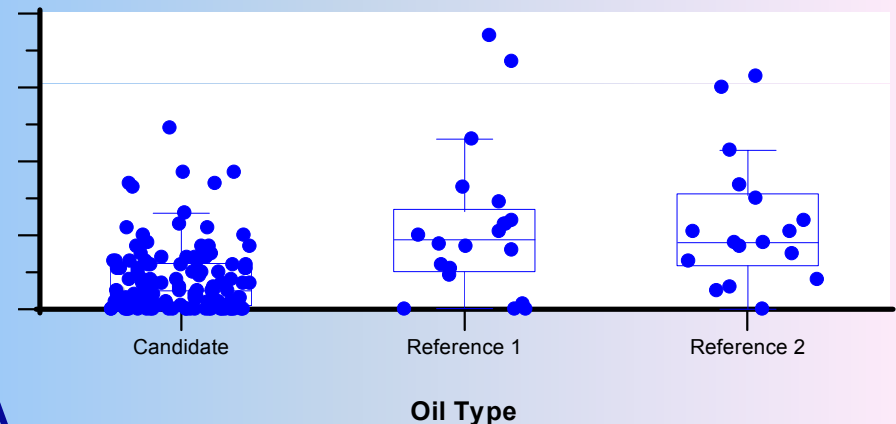
CEC MB recognised the validity of including safety parameters in a specification.

ATC support activity by providing coded candidate data from the ERC database

SDG revise CEC documentation which retain requirements for standard CEC parameters, but bring Safety Parameters into the system.

The new procedures are being tested out within the L-099 Group

Example of Data used for evaluating Potential Safety Parameter



Safety parameters often do not discriminate between the reference fluids, and so did not meet CEC's quality requirements

Quality of the test as used in the specification is potentially compromised as the Working Group does not monitor the parameter

New documentation ensures that Safety Parameters are adequately monitored, and provides advice about their use in specifications



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Conclusions

- Improving the quality of performance testing for automotive fluids is at the heart of CEC.
- CEC aims to be an industry leader in quality, without imposing an excessive quality “tariff”
- CEC is building on its experience and working with its sponsoring organisations to continue to improve quality.