

# EFNMS-SMRP MAINTENANCE AND RELIABILITY INDICATOR HARMONISATION PROJECT

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## Abstract

When a company wants to compare maintenance and reliability performance internally or externally, it needs a common platform in terms of predefined indicators so that the company can compare apples to apples. This challenge is responded to by SMRP, (Society of Maintenance and Reliability Professionals and EFNMS (European Federation of National Maintenance Societies). Last year, these two maintenance organisations launched a joint “harmonisation” activity to compare and document similarities, as well as differences, between existing indicators for maintenance and availability performance. The comparisons are being made between the SMRP Best Practice Metrics and European standard EN15341 “Maintenance Key Performance Indicators”. The goal is to publish a book of common indicators that the global maintenance manager can use as a basis for improving asset performance. This presentation will provide a status report on the progress made to date. The harmonisation process will be described, and examples of harmonized metrics and how they should correctly be applied will be provided.

**Key Words:** Indicators, maintenance, reliability, harmonisation, benchmarking

## Introduction

With increased globalization, the need for a common understanding of the indicators that are used to measure maintenance and availability performance is paramount. Seemingly small differences in how a metric is defined can dramatically affect the resulting measure. Without a common set of indicators and definitions, the ability of an international company to accurately perform benchmarking between facilities in different countries or continents is compromised. To resolve this dilemma, a team comprised of EFNMS and SMRP representatives is working toward a common set

of indicators that can be applied globally. This cooperative effort is termed harmonisation.

## European Indicator Development

The European Federation of National Maintenance Societies vzw (EFNMS) is a non-profit organization with the objective of improvement of maintenance for the benefit of the peoples of Europe. In 1998, Working Group 7 (WG7) was formed and tasked with selecting a number of benchmark indicators that were regarded as important when measuring maintenance performance [1]. In 2002, they unveiled the set of thirteen indicators listed in Table 1 [2].

Members of Working Group 7 actively participated in the standardisation activities of the European Committee for Standardization Technical Committee 319 - Maintenance (CEN/TC 319). The technical committee's efforts resulted in publication of 71 in European Standard EN:15341 Maintenance Key Performance Indicators in early 2007 [3].

The EFNMS Benchmarking Committee (previously called WG 7) utilizes the indicators in EN: 15341:2007 to conduct workshops through Europe and the Middle East, at which more than 150 participants in twelve countries have been given the opportunity to calculate indicators on their company's maintenance and availability performance, and to gain a deeper understanding in the use of indicator [4].

## SMRP Metrics Development

The Society of Maintenance and Reliability Professionals (SMRP) is an independent, not-for-profit professional society dedicated to instilling excellence in maintenance and reliability, in all types of manufacturing and service organizations, worldwide. The SMRP Best Practices Committee was chartered with identifying and standardizing maintenance and reliability metrics (indicators) and terminology. This development work commenced in 2004 and continues

to the present day. The first set of approximately 30 indicators, termed metrics, was presented in 2006 [5]. Currently, there are over 70 metrics completed or under development [6].

The SMRP Best Practices Committee has also developed a workshop which utilizes the SMRP metrics.

### **Harmonisation Beginnings**

Until 2006, the SMRP work was conducted independent of the European efforts. At EuroMaintenance 2006 in Basel, Switzerland, key members of the EFNMS WG 7 and the SMRP Best Practices Committee met for the first time. The purpose of the meeting was to exchange information and to explore possible cooperation efforts.

It was clear from the start that both groups should strive to work toward a common set of indicators to best serve the needs of international companies and their local suppliers. However, since both groups had been developing indicators for some time, and these indicators were already being published, some divergence had already occurred in, formulas, definitions and grouping factors. It was decided to form a joint EFNMS-SMRP working group to resolve differences between the EN:15341 indicators and those being developed by the SMRP Best Practices Committee.

### **Harmonisation Process**

Side-by-side comparisons were made of both the indicator formulas and definitions of terms. The basis for the European terms was EN:13306:2001 Maintenance Terminology [7] and IEC 60050-191:1990 Dependability and Quality of Service [8]. The SMRP definitions are contained within each indicator (metric) description, and have been compiled in a Glossary of Terms [9]. This resulted in two extensive lists, as there were either terms or formulas that were not common to both sets.

An indicator is determined to be common if it has the same basic formula or could be universally applied. For these common indicators, it is first determined whether any differences can be eliminated. If there are differences that cannot be eliminated, the differences are qualified or explained. This is the essence of the harmonisation process.

It should be noted that the grouping of indicators is different. In EN:15341, the indicators are grouped into economic, technical and organizational sets. The SMRP indicators are categorized in accordance with the five pillars of the SMRP Body of Knowledge: Business and Management, Manufacturing Process Reliability, Equipment Reliability, People Skills and Work Management [10].

### **Harmonisation Results**

The joint working group made very good progress, announcing the first harmonisation results in January 2007 [11]. To date, the sixteen metrics listed in Table 2 have been harmonized. An additional nine indicators have been identified for harmonisation. Each is classified as:

- **IDENTICAL** – the bases of the indicators are the same, although there may be some differences in how they are presented. The differences are detailed in the comments.
- **SIMILAR** – there are some differences in the differences that are detailed in the comments
- **SAME PERFORMANCE** – the indicators measure the same performance area, but there are significant differences in the definitions or calculations that are detailed in the comments.

When an indicator is harmonized, a statement declaring this fact is added to the SMRP metric description. Furthermore, the SMRP metric is recommended for use by EFNMS as a guideline or supporting document for the European Indicator

Once the harmonisation efforts are deemed to be complete, a book of harmonized indicators will be published. Also, the indicators were used in the first world's first SMRP-EFNMS Benchmarking Workshop, which was being held at Euromaintenance 2008 in Brussels.

### **Harmonisation Future**

The harmonisation work will continue through 2008, or until the list of SMRP indicators currently under development has been exhausted. It is desired to initiate similar harmonisation efforts with other international maintenance organizations, such as COPIMAN (Technical Committee on Maintenance of the Pan American Federation of Engineering Societies) or MESA (Maintenance Engineering Society of Australia).

It is also desired to promulgate the use of these indicators as accepted standards. Discussions are ongoing with CEN/TC 319 to consider proposing the harmonized metrics as global standards or guidelines.

For further information, visit our website at [www.HarmonisedIndicators.org](http://www.HarmonisedIndicators.org).

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I:01 Maintenance costs as a % of Plant replacement value
I:02 Stores investment as a % of Plant replacement value
I:03 Contractor costs as a % of Maintenance costs
I:04 Preventive maintenance costs as a % of Maintenance costs
I:05 Preventive maintenance man hours as a % of Maintenance man hours
I:06 Maintenance costs as a % of Turnover
I:07 Training man hours as a % of Maintenance man hours
I:08 Immediate corrective maintenance man hours as a % of Maintenance man hours
I:09 Planned and scheduled man hours as a % of Maintenance man hours
I:10 Required operating time as a % of Total available time
I:11 Actual operating time as a % of Required operating time
I:12 Actual operating time / Number of immediate corrective maintenance events
I:13 Immediate corrective maintenance time / Number of immediate corrective maintenance events

Table 1: EFNMS- Original WG 7 Indicators

Table 2: EFNMS-SMRP Harmonized Indicators

SMRP Metric		EN 15341 Indicator No.	Harmonisation Result	Difference or comment
No.	Name			
1.4	Stocked MRO Inventory Value as a Percent of RAV	E7	IDENTICAL	Both indicators exclude depreciation cost for strategic parts
1.5	Annual Maintenance Cost as a Percent of RAV	E1	IDENTICAL	The difference is that EN 15341 has a broader definition and includes depreciation of maintenance owned equipment in "Annual maintenance cost"
3.5.1	Mean Time Between Failures (MTBF)	T17	IDENTICAL	
3.5.2	Mean Time to Repair (MTTR)	T21	IDENTICAL	The difference is in the glossary EN 15341 refers to "R Restore" while SMRP refers to "R Repair". IEC 15191 term 191-13-08 approves "restoration" as well as "repair" Conclusion: The difference is academic.
4.2.1	Maintenance Training Costs	E21	IDENTICAL	
4.2.2	Maintenance Training Hours	O23	SIMILAR	The difference is in the calculation method. EN 15341 expresses the result as a percentage. SMRP calculates the result as hours per year. Nominator are similar for both metrics while EN 15341 expresses the indicator as a percentage of "maintenance personnel" hours. Conclusion: The metric pursues the same performance. The difference is in the presentation of the indicator
5.1.1	Corrective Maintenance Cost	E15	IDENTICAL	The difference is that EN 15341 has a broader definition and includes depreciation of maintenance owned equipment in "total maintenance cost". The maintenance work types only apply for SMRP.
5.1.2	Corrective Maintenance Hours	O16	IDENTICAL	SMRP defines the denominator as "total available maintenance hours". EN 15341 defines the denominator as "total maintenance man hours" Conclusion: No major difference; the difference is in the wording. The maintenance work types only apply for SMRP.
5.4.1	Reactive Work	O17	SAME PERFORMANCE	The difference is that metric 5.6.1 measures the labour hours that breaks into the maintenance schedule. Indicator O17 measures only the labour hours spent on equipment failure requiring immediate action regardless of schedule or no schedule. When comparing metric 5.6.1 will be higher since it measures labour hours spent on equipment failure + poor planning + rapid change of priorities.
5.4.2	Proactive Work	O18	IDENTICAL	The difference is in the glossary. Hours for preparation of procedures (f)
5.4.4	Schedule Compliance Work Orders	O22	IDENTICAL	
5.5.6	Craft Workers on Shift Ratio	O10	IDENTICAL	
5.5.8	Overtime Maintenance Hours	O21	SIMILAR	EN15341 calculates direct and indirect personnel. SMRP calculates direct personnel. Permanent contractors are included in SMRP metric 5.5.8
5.5.33	Stock Outs	O26	IDENTICAL	The difference is in the way the performance is calculated EN 15341 measures the success rate, while SMRP measures the "unsuccess rate"
5.5.71	Contractor Maintenance Cost	E10	IDENTICAL	The difference is that EN 15341 has a broader definition and includes depreciation of maintenance-owned equipment in "annual maintenance cost"
5.7.1	Continuous Improvement Hours	O8	IDENTICAL	