



The EFNMS certification

The pros and cons of adopting the EN-15628 standard on the EFNMS certification process

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The present structure

Committees shall be organized according to the *EFNMS Maintenance Landscape*

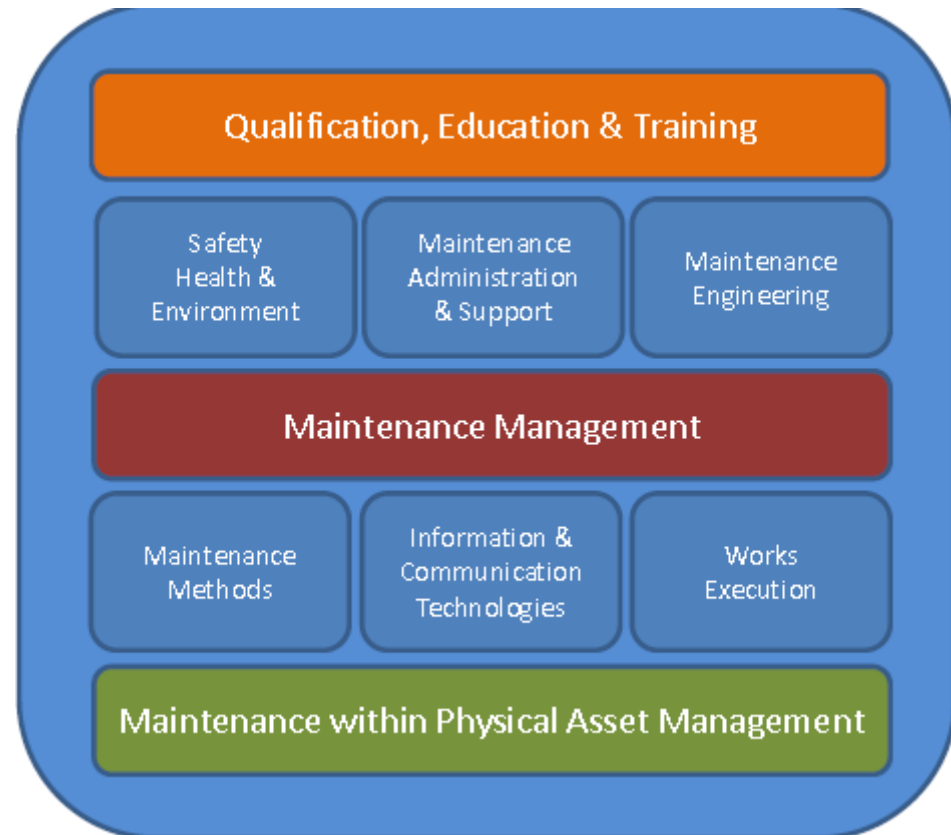
- Maintenance within Physical Asset Management
- Maintenance Management
- Administration in Maintenance
- Maintenance Engineering
- Maintenance Methods
- Information and Communication Technologies
- Safety, Health & Environment
- Execution
- Qualification & Certification

EFNMS Landscape

By the term **‘maintenance’** we mean:
The combination of all technical, administrative and managerial actions during the lifecycle of an item intended to retain or restore it, to a state in which it can perform its required function.
(Source: EN13306)

With the **“EFNMS Maintenance Concept”** we describe the business, the activities and functions we are working on and on which we are providing valuable information, g.g.:

- Standards
- Regulations
- Recommendations
- Procedures
- Tools
- References
- etc.



Work flow

The Coordinator Projects and Committees will, together with committee chairmen and the board of directors define the strategic development framework.

Based on this framework development projects will be defined and assigned to the respective Committee.

The Executive Director then invites National Maintenance Societies to delegate their experts into the working committee to execute the project.

Activities in/from the committees

- Project (execution)
- Information provided / expected (reports, brochures)
- Communication between BoD – WG – GA? (information)
- Provide presentations during conferences/seminars/workshops
- Responsible participants in the projects
- Represent EFNMS (external)
- Take part in discussions about
 - Trends
 - New Products, latest Developments
 - Concepts, metodes
 - Conferences
 - Activities/projects in the societies
 - ?

Organization

Each of these functions shall have a Chairman.

- Some of the committees will be permanent
- Some will be established case by case

Types of Project/ activities in committees

- Internal project - none external partners
- External project - EFNMS WG, together with an external partners
- EFNMS - Sleeping partner, the project execution is external and EFNMS is observing
- Information of ongoing project (outside EFNMS)

Requirements on Projects

- Defined targets, project plan, topic, final results to be achieved,..
- Approved project
- Relevant and new topic
- Responsibilities and owner of result defined
- Resources (include economic rules)
 - Money
 - People
- Administration
 - Organization, leader, management
 - System/tools

Project work within the aim of the committee

Work/activities based upon a Business plan which includes:

- Aim of the Project and clear defined targets
- Limitation of the project, defined boundaries
- The project shall be in line with the EFNMS Strategy
- Detailed action plan to be established
- Defined milestones for project reviews every 6 months, twice per year
- Defined results expected
- Defined time schedule, 24 months
- Defined Budget
- Based on an agreement between the EFNMS and the Work Group
- Clear rules and guidelines
- ?

Project work within the aim of the committee, cont.

- Projects to be confirmed by the delegates/**GA**
- Committee must represent excellent knowledge on the project topic and in maintenance management
- The committee shall have representatives from at least 4 countries
- **Mainly** voluntary work

Project types, examples

- Write/develop reports/guidelines for:
 - Best practices examples
 - Excellence in Maintenance
 - World class in Maintenance, together with the Global Forum
 - New standards
 - Information
 - utilization
- Establish guidelines for procedures/processes
- Evaluation of tools, Systems and methods
- Investigations/surveys on trends in maintenance and asset management
- Presentation of selected topics
- Developing of new concepts, programs, etc.
- Theoretical presentation of a “New Topics”

Projects/activities dissemination (examples)

- Select projects/activities (example new standard)
- Requirements to the committee
 - Understand and have knowledge about selected projects/activities
 - Know the background
- Activities in the committees
 - Analyse and discuss the selected projects/activities
 - May be write a summary/report
 - Inform the GA/NMS
 - Propose further activities for the committee
 - Arrange/support seminar/conference (international/national)
 - Have lectures for example for the NMS
 - Develop a report/guidelines -- closing

Requirements on the Experts

- Experts
 - Good knowledge in
 - Maintenance topics and management experience
 - Presentation and writing skills
 - Positive attitude
 - People approved by his/her national society
 - Project Leader (will be elected by the working group)
 - **Mainly** Voluntary work not paid (EFNMS doesn't pay hours, **unless the project is funded by EU or a third party**)
 - Ownership of the results is with the EFNMS

Requirements on the reports

- Standard report must contain:
 - Front/Cover page
 - Content page
 - Introduction, Management Summary
 - Current situation, explaining the aim of the project
 - Analysis of the actual situation, available information, tools, systems, methods, etc.
 - Theoretical part
 - Practical part
 - Value for the user
 - Conclusion
 - Fonts, template, colors, etc.

Dissemination of the results

- EFNMS shall provide
 - Marketing for the results / product
 - Provide Brochures
 - Platform of conferences, Seminars, Trainings
 - Organize meetings, seminars and conferences
 - Publishing media/possibilities
 - Web page
 - Selling books, reports, etc.

Definition

Competence

The proven ability to use knowledge, skills and personal, social and/or methodological abilities, in work or study situations and in professional and personal development. Competence is described in terms of responsibility and autonomy

Definitions

Qualification & Certification

Qualification is a formal outcome of an assessment and validation process which is obtained when a competent body determines that an individual has achieved learning outcomes to given standards. The determination can be made by the same body which has given the training to the individual.

Certification refers to the confirmation of certain characteristics of a person provided by an external review. The confirmation can only be made by a body which has not given the training to the individual. Within the EFNMS this is assured by the European Certification Committee.



**The certification body shall not offer or provide training,
or aid others in the preparation of such services,**
unless it demonstrates how training is independent
of the evaluation and certification of persons
to ensure that confidentiality and impartiality are not compromised.

**The certification body shall be structured so
as to give confidence to interested parties
in its competence, impartiality and integrity.**

In particular, the certification body:
shall be **independent and impartial**
in relation to its applicants, candidates and certified persons,
including their employers and their customers,
and shall take all possible steps to assure ethical operations;

Definitions

Competence = Capacity x Willingness

Capacity = Knowledge x Ability

Willingness = Attitude x Motivation

Definitions

Competence

Knowledge + Skills + Abilities

- **Facts**
- **Principles**
- **Theories**
- **Practices**

To apply knowledge and use know-how

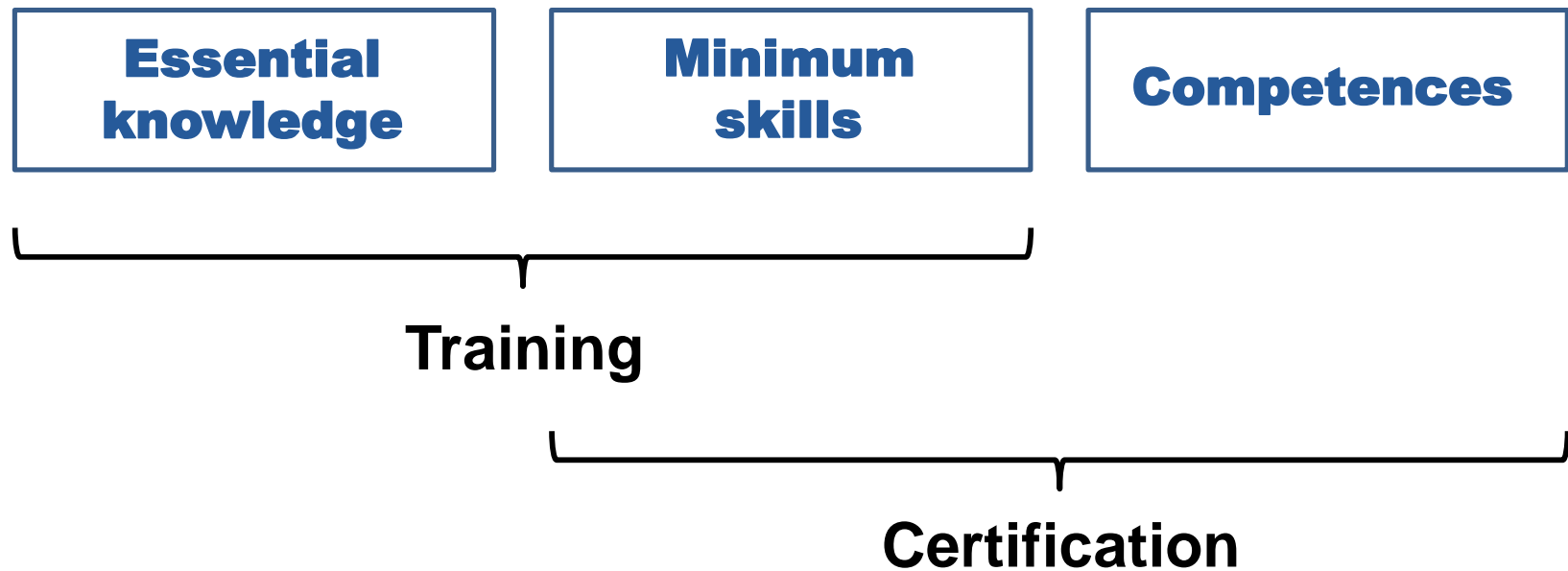
Social and/or methodological

**Essential
knowledge**

**Minimum
skills**

Competences

Training vs Certification



The New European Standard

EN 15628

The standard considers the following professional persons in the maintenance organisation:

- * **Maintenance Manager**
(Responsible of Maintenance Service or Function)
- * **Maintenance Supervisor and Maintenance Engineer**
- * **Maintenance Technician Specialist**
(Responsible and/or Operative)

Existing Specification vs EN 15628



*** Maintenance Manager**

Minor changes

• Maintenance Supervisor /
Maintenance Engineer

Completely new

*** Maintenance Technician Specialist**

Minor changes

FprEN 15628:2014

Competences of a Maintenance Manager

- C.1. define and develop maintenance policies according to corporate strategies;
- C.2. define processes and tools to support maintenance activities;
- C.3. define, manage and develop the organizational model of maintenance;
- C.4. Ensure the levels of reliability, availability, maintainability, safety and quality required for the entire useful life of assets;
- C.5. ensure proper management and continuous improvement of maintenance;
- C.6. ensure and control the compliance with the budget, the respect of the planned maintenance activities and the proper condition of assets;
- C.7. define strategies, policies and criteria for performance management of contractors and for the definition of maintenance materials requirements.
- C.8. communicate to executive management and other business units.

Management and Organisation

- 1 Company management policy
- 2 Company maintenance policy
- 3 Maintenance goals
- 4 Maintenance strategies
- 5 Maintenance activities requirements
- 6 Organize maintenance activities
- 7 Human and material resources
- 8 Health & Safety, Environment conditions
- 9 Guide, control and analyse the activities
- 10 Develop and use key-figures
- 11 LCC/LCP techniques/methods
- 12 Logistics support, spare part calculations
- 13 Measure and analyse the results
(Technical, organizational and economical)
- 14 Activities for new equipment
- 15 Define future maintenance needs
- 16 Define and implement human resources policy
- 17 Actual European standards in maintenance
- 18 Laws and regulations
- 19 Contribution for production quality

Maintenance Information Systems

- 20 Maint. Management Information Systems
- 21 Planning, WO, Techn/Ec analysis, etc
- 22 Documentation/Information systems
- 23 Techn. Process control systems
- 24 Expert systems
- 25 Computer support

Availability performance

- 26 Reliability
- 27 Maintainability
- 28 Supportability
- 29 Availability
- 30 Improvements
- 31 Mathematical & statistical formulas
- 32 Human reliability
- 33 Production safety
- 34 Risk analysis
- 35 Quality assurance
- 36 Laws and regulations

Maintenance Methods and Techniques

- 37 The theory of failure pattern
- 38 Types of wear and tear
- 39 Improvement techniques
- 40 Preventive techniques
- 41 Inspection techniques
- 42 Condition monitoring techniques
- 43 Methods of life extensions
- 44 Measurement methods
- 45 Control systems
- 46 Performance improvement techniques
- 47 Repair techniques

← **Exam Part 1**

↑
Exam Part 2

FprEN 15628:2014

Competences of a maintenance technician specialist

- A.1. perform or ensure the execution of the maintenance plans according to business strategies;
- A.2. act promptly in case of failure or malfunction, ensuring the effectiveness of the restoration;
- A.3. perform or ensure the properly execution according to rules and procedures relating to safety, health and environmental protection;
- A.4. ensure the availability of materials, tools and equipment necessary for the execution of maintenance activities;
- A.5. coordinate and / or supervise on site maintenance activities;
- A.6. ensure the quality of the maintenance activities;
- A.7. use and ensure the use of the IT systems and of the technology tools.

The five parts of the examination

1 45 questions in 45 min

11.1 Work Planning

11.2 Team Working and
Communication

1.4 Information
Technology

1.5 Training and
Instructions

11.6 Quality Assurance
(Systems)

11.7 Environment

1.8 Automation

2 75 questions in 75 min

2.1 Maint. Objectives
and Policies

2.2 Maintenance
Concepts

2.3 Restoration
Techniques

2.4 Maintenance
Terminology

2.5 Contracts

2.6 Laws and
Regulations

2.7 Condition
Monitoring

2.8 Fault Finding
Techniques

2.9 Improvement
Techniques

2.10 Documentation

2.11 Spare Part
Management

2.12 Materials
Technology

3 30 questions in ½ hour

1.3 English language

4 1 hour

3.1 Practical
Computer Handling

5 1 hour

3.2 Practical
Fault Finding

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Competences of a maintenance supervisor/engineer

- B.1. ensure the implementation of maintenance strategies and policies;
- B.2. plan the maintenance activities within his area of responsibility, defining and organizing the necessary resources;
- B.3. organize, manage and develop the maintenance resources: personnel, materials and equipment;
- B.4. ensure compliance with regulations and procedures related to safety, health and environment;
- B.5. ensure technical and economic efficiency and effectiveness of maintenance activities based on a technical state of the art ;
- B.6. participate in the technical materials management and manage the contractors performance;
- B.7. communicate to all necessary partners like staff, contractors, customers and suppliers.

Main-Cert

The key competences for the specialist certificate maintenance are

- Definition of the maintenance need/strategy mix
- Organisational structure
- Order management
- Resource management
- Management of external service providers
- Managing documentation and information
- Maintenance controlling
- Data management systems for the field of maintenance
- Technical diagnostics
- Modern methods and maintenance as added value

Validation of Qualifications

**Target
Qualifications**

The significance of a seriously performed Certification process can be summarised in the following bullet points:

- * Quality
- * Confidentiality
- * Neutrality
- * Independent

**Basic
Qualifications**

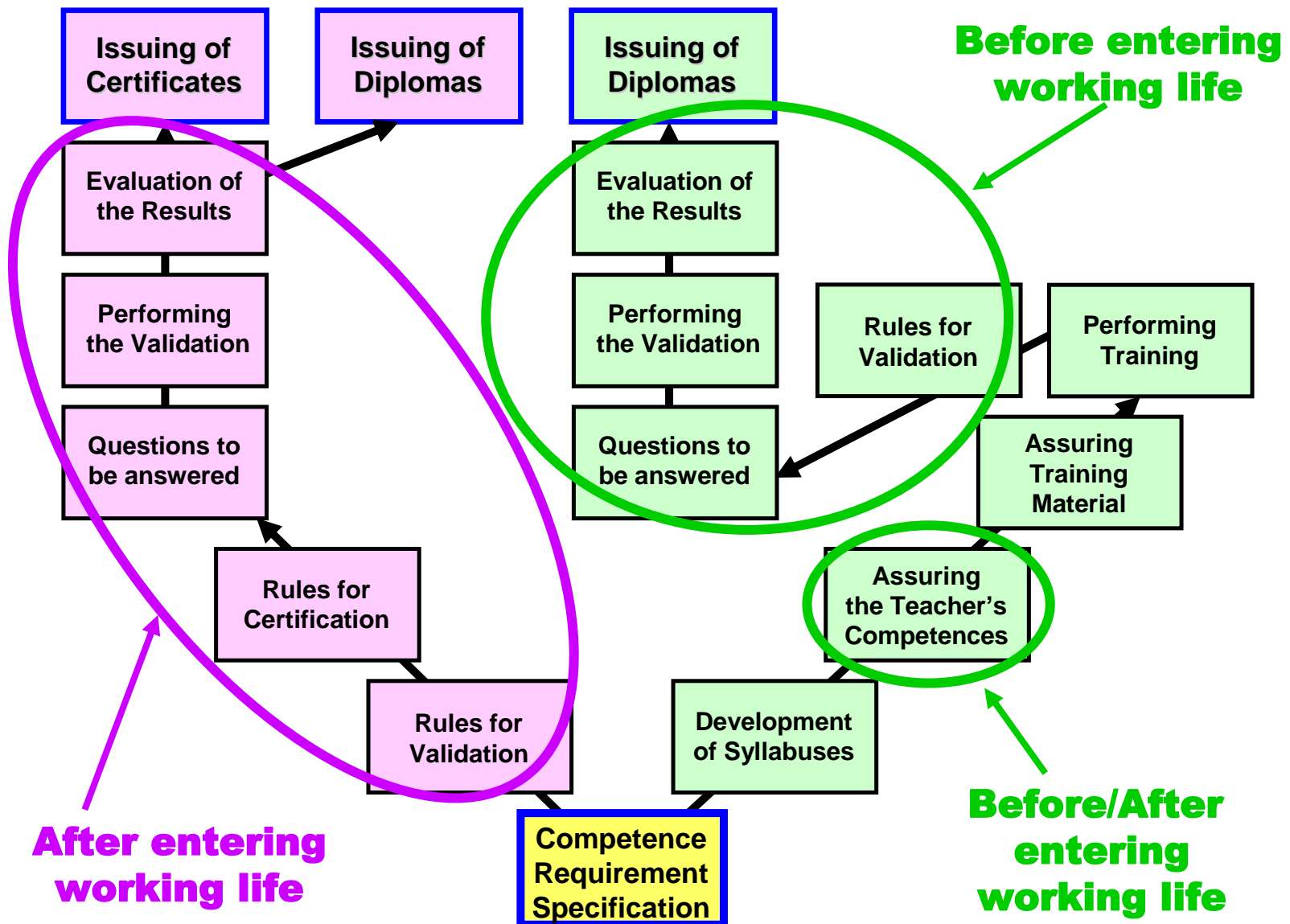
The Competence, Validation and Certificate

The European Federation of National Maintenance Societies, the EFNMS, has specified the requirements regarding the **COMPETENCE** for an *European Expert in Maintenance Management* and for an *European Maintenance Technician Specialist*.

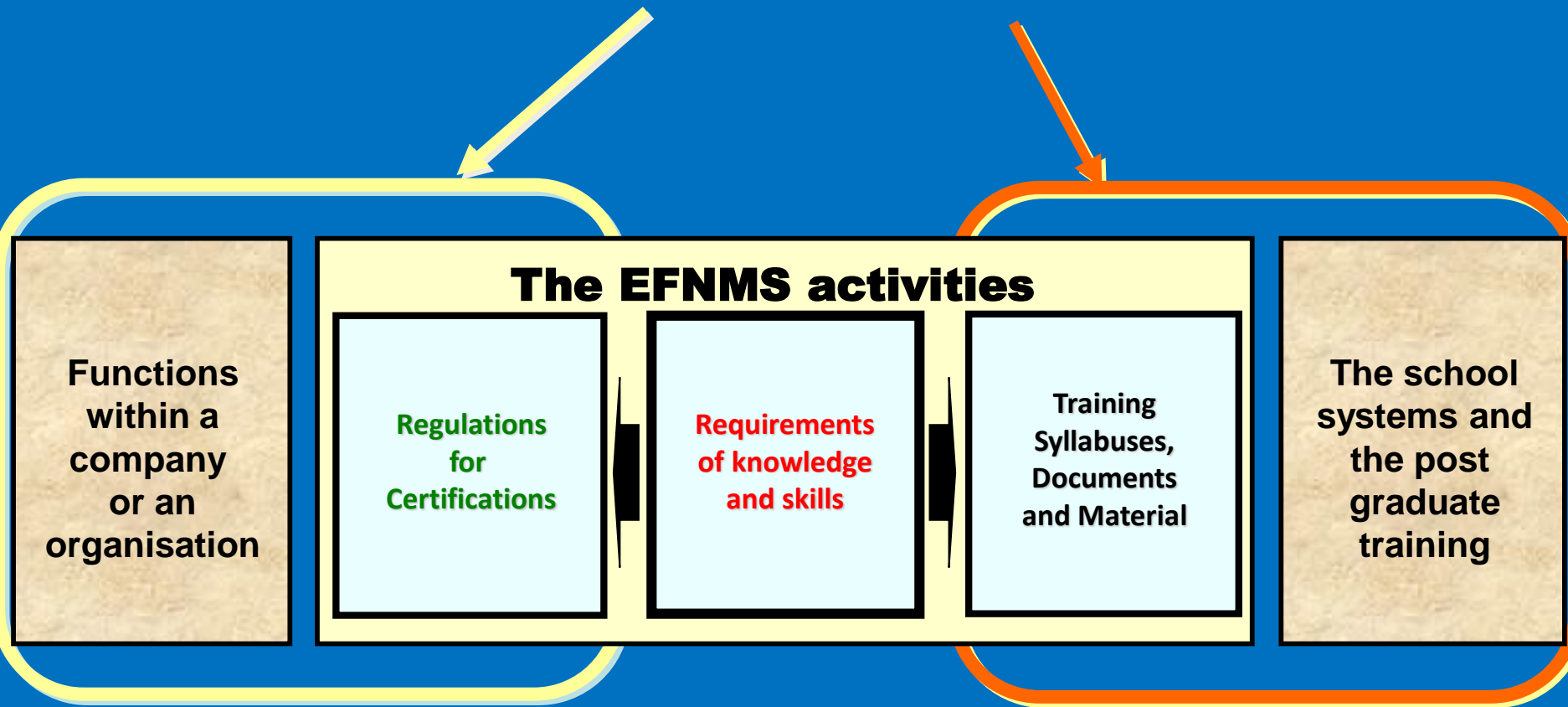
The EFNMS has also specified the requirements and rules for a **VALIDATION** of these competencies.

Those individuals which achieve the stipulated pass criteria in a validation will receive the EFNMS **CERTIFICATE**.

Maintenance Competence Assessment



The EFNMSvzw Certification and Training Organisation



EFNMS

Specifications for Theoretical Knowledge and Practical Experience

- | | |
|---|-------------------------|
| Maintenance Management | - Exists since 1993 |
| Maintenance Supervision | - Will exists from 2015 |
| Maintenance Technician Specialists | - Exists since 2001 |

The EFNMS Specification Levels

**Professional functions
within a company
or an organisation**

Maintenance Management M

Maintenance Supervision S

Maintenance Technician Specialists T

Acting on a strategic level

Develop and implement
maintenance strategy, policy and objectives

Acting on a tactical level

Implement
maintenance strategy, maintenance
engineering, policy and objectives

**Functional co-ordinator for supporting
groups**

Acting on an operational level

Understand
maintenance strategy, policy and objectives

**Independently perform and co-ordinate
maintenance activities**

Management and Organisation

Goal, strategies, results
Organisation, competence
Procurement, selling of service
Guiding, control, analysis
Economical control, LCC, LCP
Material handling, logistics

Reliability Performance of Production Plants

Definitions
Measurements, mathematical
formulas
Requirements, control, analysis
Design, procurement, operation
Laws, regulations

Maintenance Information Systems

Planning, ordering, analysis
Documentation
Information systems
Technical/economical analysis

Maintenance Methods and Techniques

Remote control
Condition monitoring
Preventive activities
Repair techniques and methods

Management and Organisation

Very good knowledge in:

- How to set up a company management policy in order to be able to participate in its definition as far as maintenance is concerned
- How to formulate the maintenance policy within a company
- How to formulate the maintenance goals
- Different maintenance strategies and how to choose the right strategy
- How to specify the requirements for the maintenance activities
- How to organize the maintenance activities, how to choose a suitable organization and assure the right competence within the organization
- How to determine the human and material resources in order to implement the organization
- How to assure (by maintenance activities) the health and safety and the right environment conditions (inside and outside the company)
- How to guide, control and analyse the maintenance activities
- How to develop and use key-figures for the economical control
- LCC/LCP techniques/methods
- Logistics support, material and store handling, methods for spare part calculations
- How to measure and analyse the results of the maintenance activities, e.g. efficiency and economy
- The maintenance activities in the development and procurement of new production equipment
- How to define the future maintenance needs of a company

Good knowledge in:

- How to define and implement human resources development policy

Availability Performance of Production Plants

Very good knowledge in:

- Reliability
- Maintainability
- Supportability
- Availability
- Improvements of availability performance

Good knowledge in:

- The mathematical and statistical formulas to be used in the specifications and for verifications
 - Human reliability
 - Production safety
 - Risk analysis
-

Maintenance Information Systems

Very good knowledge in:

- Maintenance Management Information Systems
(key-figures, guidance tables and so on)

Good knowledge in:

- Maintenance Information Systems
(for planning, work-order, technical/economical analysis, and so on)
 - Technical documentation/information systems
 - Technical process control systems
-

Maintenance Methods and Techniques

Good knowledge in:

- The theory of the failure patterns
- Types of wear and tear
- Improvement techniques (aiming at reducing failure rates and down times)
- Preventive techniques
- Inspection techniques
- Condition monitoring techniques
- Methods of life extensions
- Measurement methods
- Control systems

Management and Organisation

Very good knowledge in:

- How to set up a company management policy in order to be able to participate in its definition as far as maintenance is concerned
- How to formulate the maintenance policy within a company
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- How to assure (by maintenance activities) the health and safety and the right environment conditions (inside and outside the company)
- How to guide, control and analyse the maintenance activities

Availability Performance of Production Plants

Very good knowledge in:

- Reliability
- Maintainability
- Supportability
- Availability
- Improvements of availability performance

Good knowledge in:

- The mathematical and statistical formulas to be used in the specifications and for verifications
- Human reliability
- Production safety
- Risk analysis

Management and Organisation

- **How to formulate the maintenance goals.**
 - to describe the general requirements for maintenance goals
 - to describe the process of the development of maintenance goals
 - to give examples of maintenance goals
 - to describe the relationship between goals and policy
- **How to assure (by maintenance activities) the health and safety and the right environment conditions (inside and outside the company).**
 - to describe different conditions in the production equipment that may cause risks for health, safety and the environment (inside and outside the company)
 - to describe the possibility to prevent such incidents by maintenance activities, including co-operation with other departments in the company and external parties

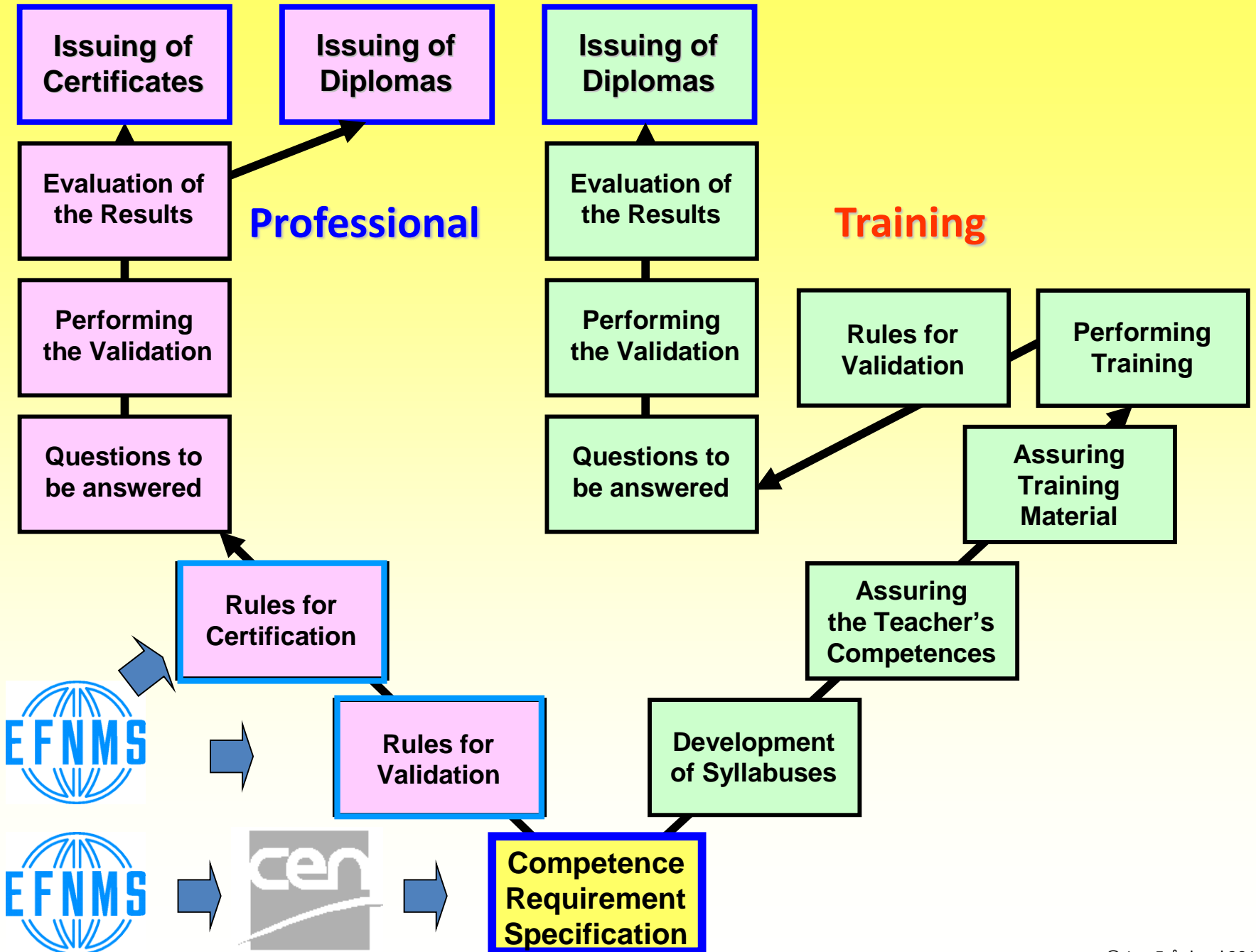
Availability Performance of Production Plants

- **Maintainability**
 - to understand that this has to do with active time for maintenance
 - to be able to define maintainability
 - to describe some different measures of maintainability (e g MTTR, M, etc)
 - to be able to calculate the maintainability
 - to describe which time elements that are included and not included in the calculation (e g preparation time, functional check out, waiting for resources)
 - to be able to analyse what causes the length of active maintenance times

The Competence Specifications:

www.efnms.org

“Publications”



The prestigious certificates from EFNMSvzw



The EFNMSvzw European Certification Committee

Jan Frånlund

UTEK

Sweden

Chairman

Per Schjølberg

NFV

Norway

Ivo Cala

HDO

Croatia

Matti Niemelä

Promaint

Finland

Bernardo Tormos

AEM

Spain

The EFNMSvzw Certification Summary

- Within the EFNMS there have been adopted rules and requirements to achieve the EFNMS Certificate for maintenance professionals. These rules and requirements are for Maintenance Management and Maintenance Technician.
- In a worldwide comparison it has been found that the EFNMS Certificates have got the best reputation.
- By the end of 2007 a computerized system for validation of maintenance technicians has been ready for use. This system can be used for guidance of additional training or become the test for an EFNMS certificate. This cost effective solution for validation has received an enormous interest.

A certification of competence consists of a set of steps to be performed

In summary these steps are:

1. **The Competence Requirement Specification**
2. **The Rules for the Certification of the Competence,
including the minimum test result which has to be achieved
to become in conformity with the Competence Requirement
Specification**
3. **The Development of the Questions to be answered in the test**
4. **The Evaluation of the Results for each candidate**
5. **The Issuing of the Certificates**

The different possibilities

1. Exam with diploma issued by the Nat. Soc.

1. "Management and Organisation" and "Maintenance Information Systems" (40/55 p) 4 hours
2. "Reliability Performance of Production Plants" and "Methods and Techniques" (30/45 p) 3,5 hours

An EFNMS controller is present during the exam and the markings.

Possible result: **PASSED EXAM**

2. National Certificate issued by the Nat. Soc.

3. Passed exam for item 1 and 2 above
4. Five years practical experience within maintenance, of which two years of them in a managing position. At least one year of this should have occurred during the last 18 months.

Possible result::

"NATIONAL EXPERT IN MAINTENANCE MANAGEMENT"

3. European Certificate issued by the EFNMS

5. Passed 1 – 4 above
6. Exam in maintenance terms in the English language 1 hour
(Will be performed the same day as 1 and 2 above, and with the same controller)

Possible result:

"EUROPEAN EXPERT IN MAINTENANCE MANAGEMENT"

Some proud Maintenance Technicians Specialists and Experts in Maintenance Management who have received the Certificates from the EFNMS



**The process of conducting
an EFNMS Certification Exam**

A recommended time schedule

1. Decide upon date for the exam, in co-operation with the ECC
2. Make the reservation of the examination room
3. Send out the invitation, including the price and the deadline for the registration

● = The ECC representation

5. Perform the Examination

- 3 months

- 2 months

- 1 month

4. Make the questionnaires

The Exam

+ 1-2 days

+ 1 week

+ 1 month

At a suitable moment within 3 months

6. Make the markings of the result

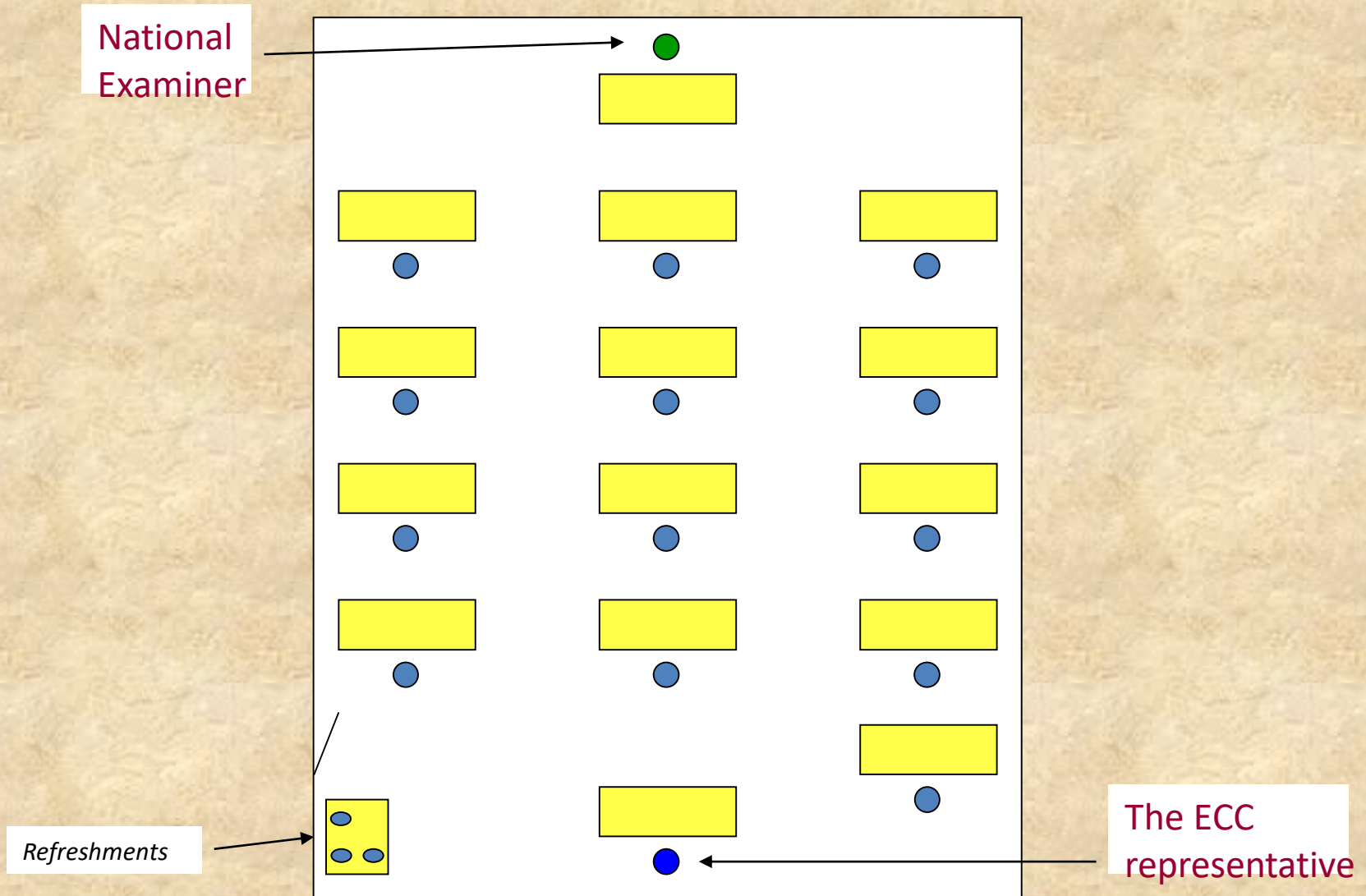
7. Distribute the results

9. Analyse the result

8. Delivery of Diplomas and Certificates

**1. Decide upon the date for the exam,
in co-operation with the ECC**

2. Make the reservation of the examination room



3. Send out the invitation, including the price and the deadline for the registration

*Everybody are welcome,
regardless of any preparation
by a training course or not*

- Room rent
- Refreshment
- Lunch
- Own personnel
- ECC person
- Own administration

Inbjudan till tentamen i ledning av underhåll

Den svenska riksorganisationen inom underhåll, Föreningen Underhållsteknik, UTEK, inbjuder härmed till en skriftlig tentamen onsdagen den 13 september, 2006, kl 09.00 – 18.30 i Stockholm.

(Lokal meddelas dem som anmäler sig.)

Tillsammans med motsvarande riksorganisationer i Europa ingår UTEK i "European Federation of National Maintenance Societies, EFNMS". Inom EFNMS har man fastställt de krav som skall vara uppfyllda för att bli godkänd i tentamen och erhålla nationellt och europeiskt certifikat som expert inom ledning av underhållsverksamhet.

Vilka kan delta?

Alla, som så önskar, har möjlighet att delta i tentamen.

Vad leder en godkänd tentamen till?

1. Vid godkänd tentamen erhålles ett intyg, att man besitter tillräckliga teoretiska kunskaper för att kunna inneha en funktion som ledare för underhållsverksamhet (underhållschef). De teoretiska kraven på kunskaper har sammanfattningsvis indelats i följande fyra kunskapsområden, som utgör den generella kompetens som är väsentlig för att leda och styra underhållsverksamhet:

- | | |
|-------------------------------|-----------------------------------|
| 1. Ledning och organisation | 2. Drift- och anläggningssäkerhet |
| 3. Beslutsstöd inom underhåll | 4. Underhållsmetoder |

En detaljerad beskrivning av kunskapskrav och tentamensregler kan rekvideras från UTEK.

2. Vid godkänd tentamen och uppfyllande av nedanstående krav på praktiska erfarenheter inom underhåll, erhålles ett certifikat som "Svensk expert inom ledning av underhåll":

- Arbetat inom underhåll i minst 5 år, varav minst 2 år i en arbetsledande funktion.
- Minst 1 år därav skall ha infallit inom de senaste 18 månaderna.

(Om dessa villkor inte är uppfyllda när tentamen godkännts men hinner bli det inom ett år därefter, utdelas certifikatet då, när samtliga villkor uppfyllts.)

3. De som kvalificerat sig för att erhålla ovanstående certifikat, samt vid en tentamen visat sig ha tillräckliga kunskaper inom underhåll på det engelska språket, har rätt att erhålla ett europeiskt certifikat som "European Expert in Maintenance Management".

Anmälan till tentamen

Varje deltagare skall i förväg ha inlämnat en skriftlig anmälan och mot faktura ha inbetalt 2.950:- till UTEK. För denna summa erhåller deltagarna lunch, kaffe, etc i anslutning till tentamen och vid godkänd tentamen ett intyg, samt om övriga villkor uppfylls även ett svenskt certifikat. (För omtentamen inom ett år på ett delavsnitt skall ha inbetalts 1.500:-.)

För att erhålla det europeiska certifikatet tillkommer en kostnad på 1000:- (ca 100 €).

Genomförandet av tentamen

Praktiska upplysningar

Tentamen genomförs som en skriftlig sådan under en dag (13/9 2006).

Kl 09.00-13.00: Tentamen inom områdena: "Ledning och organisation" samt "Beslutsstöd".
Kl 14.00-17.30: Tentamen inom områdena: "Drift- och anläggningssäkerhet" samt "Underhållsmetoder".

Kl 17.30-18.30: Tentamen inom området "Engelska språket avseende fackområdet underhåll".

Under såväl förmiddag som eftermiddag kommer det i tentamenslokalen att finnas tillgängligt kaffe, frallor, läsk, etc. Under pausen mellan kl 13.00-14.00 bjuder UTEK deltagarna på lunch

Tentamensuppgifterna

En särskilt utvald grupp inom UTEK (representerande högskolor och näringsliv) har sammanställt tentamensuppgifterna. En representant från ett annat europeiskt lands underhållstekniska förening har kontrollerat svårighetsgraden på uppgifterna.

Under tentamen kommer två personer ur den utvalda gruppen att finnas på plats i tentamenslokalen. Dessutom kommer representanten från det andra europeiska landet att vara närvarande. Tentamensuppgifterna kommer att vara så utformade att vissa kräver beräkningar, andra kan vara av typen flervalsfrågor, vissa kräver uppräknningar av fakta, medan andra kräver beskrivningar. OBS: Varje deltagare måste medtaga egen fickkalkylator.

Ytterligare upplysningar

För ytterligare upplysningar kontakta: UTEK Adress: Box 10231, 100 55 Stockholm
Tel: 08-664 09 25 Fax: 08-664 09 26 E-mail: utek@telia.com

Välkommen med Din anmälan!

Sänds till UTEK per post eller telefax. OBS: Skall vara UTEK tillhanda senast den 30 augusti 2006.

ANMÄLAN till tentamen den 13 september 2006 i Stockholm

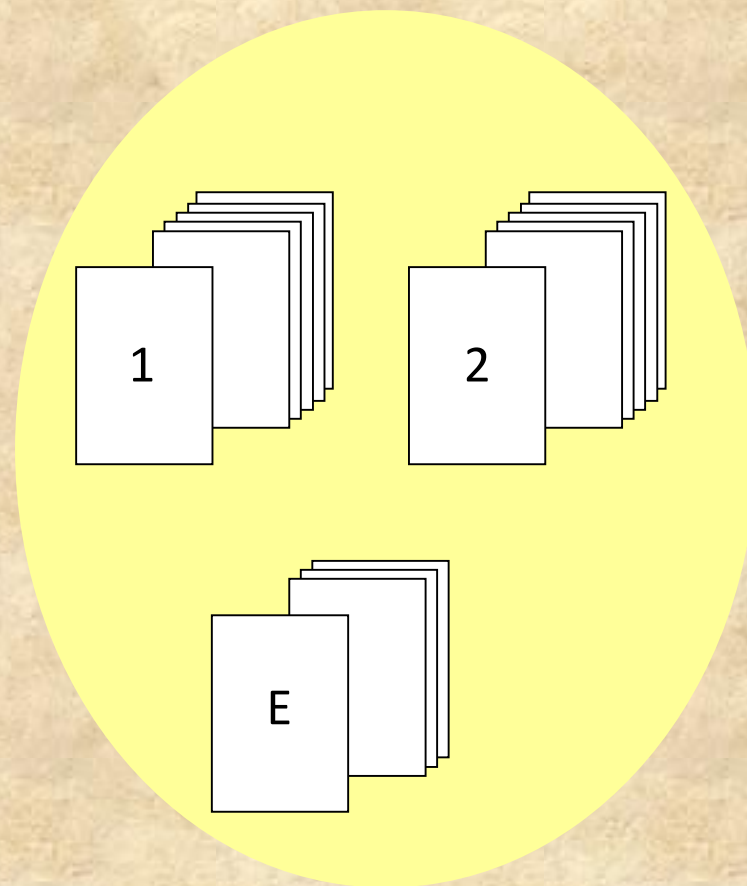
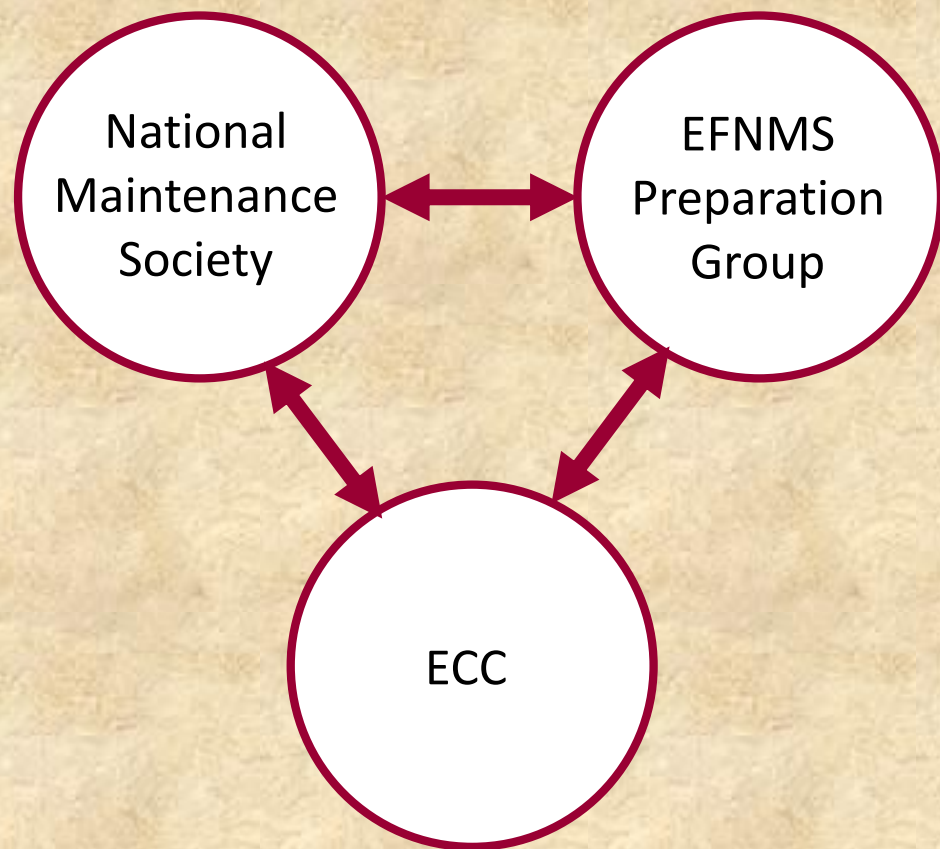
Undertecknad anmäler sig härmed att delta i den av UTEK anordnade tentamen avseende teoretiska kunskaper för ledning av underhåll, som äger rum den 13/9 2006:

..... Textat namn Mobiltelefon
..... Adress Telefon arbetet
..... Postnummer, Ort Telefax

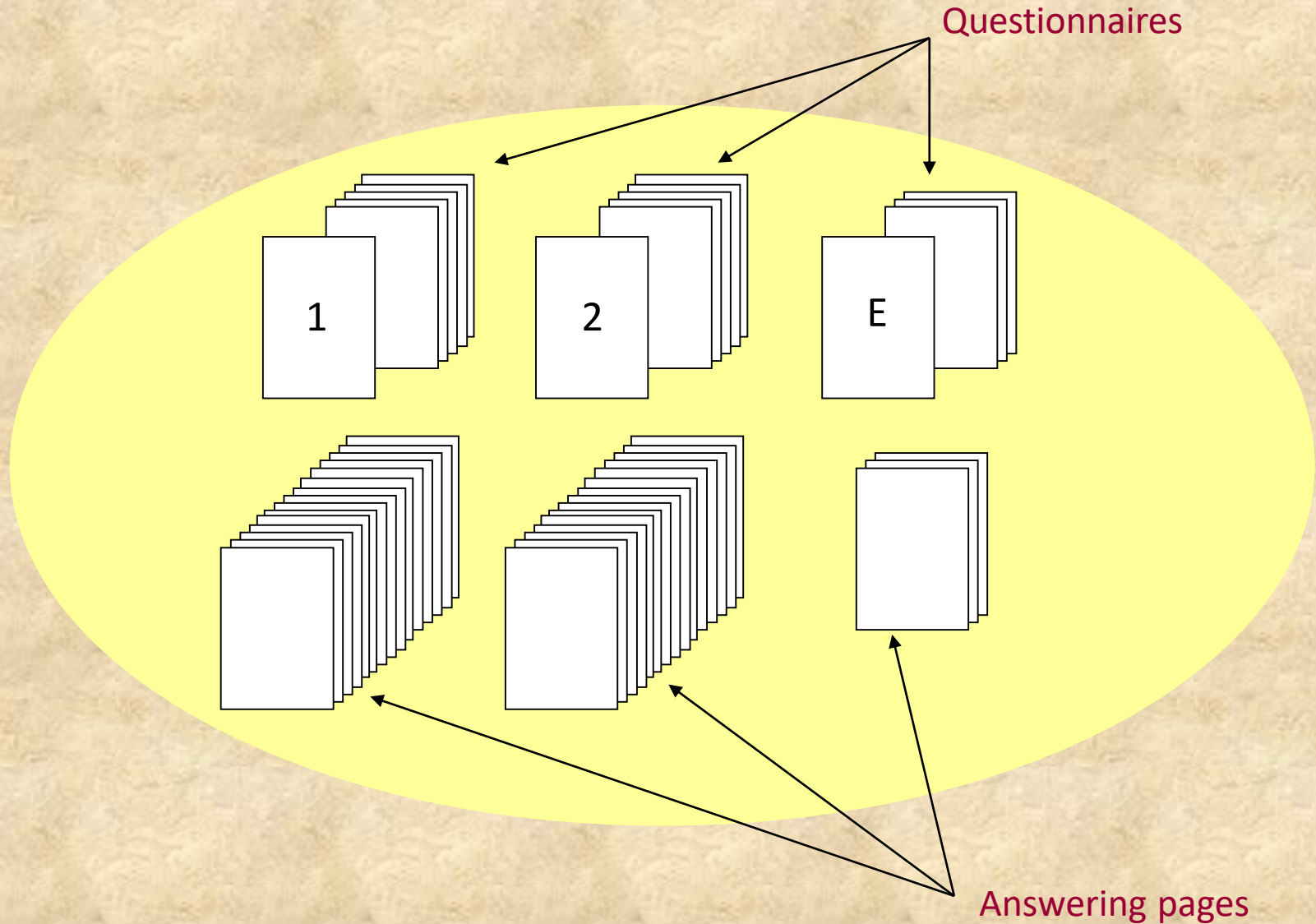
..... den / 2006

.....
Underskrift

4. Make the questionnaires



5. Perform the Examination



The first page of the questionnaire

Tentamen över teoretiska kunskaper inom ledning av underhåll

Skriftligt prov i "Drift- och anläggnings säkerhet" samt "Underhållsmetoder"

Ondagen den 1 februari 2006 kl. 14:00 – 17:30.

Denna tentamen innehåller 5 sidor med uppgifter och 15 sidor svarsblanketter.
(Kontrollera att Du har fått alla!)

Du kan maximalt uppnå 45 poäng. För att få godkänt erfordras minst 30 poäng.

ANVISNINGAR

Svaren skall lämnas på särskilda svarsblanketter. För varje svar skall anges uppgiftens nummer och tydliga avgränsningar skall framgå mellan olika uppgifter. Behövs fler svarsblanketter kan de fås av tentamensledningen. Inlämning får ske tidigast efter en halvtimme. (Ev senkomna deltagare bereds därmed möjlighet att delta i tentamen.)

Skriv ditt namn på samtliga svarsblanketter.

Resultatet av provet meddelas per post. Skriv därför Din postadress nedan.

Namn:

Personnummer: -

Adress:

Tel.: E-mail:

Mobil:

Det skriftliga provet i "Drift- och anläggnings säkerhet" samt "Underhållsmetoder"

är rättat den / 2006.

Maxpoäng: 45. Godkänd: 45 – 30 poäng. Uppnådda poäng:

For UTEK

EFNMS kontrollant

The EFNMS Certification of European Experts in Maintenance Management

Sample Questions from earlier Examinations

Part 1: “Management and Organisation” + “Maintenance Information Systems”

1. (4 points)

- a) Formulate the maintenance goals for a company and explain the ideas behind the chosen wordings.
- b) Give at least five examples of maintenance strategies that will support the maintenance goals.

2. (8 points)

The way the maintenance activities are organised are essential for the need of and possibility to measure the results.

- a) Describe 4 different possibilities to organise the maintenance activities.
- b) How will you develop and assure the right competence within each of these 4 organisations?
- c) For each of the 4 organisations, describe:
 - the need to measure certain parameters
 - the possibilities to measure these parameters
 - the possibilities to measure problems and give examples of the two most essential parameters for each of the organisational alternatives

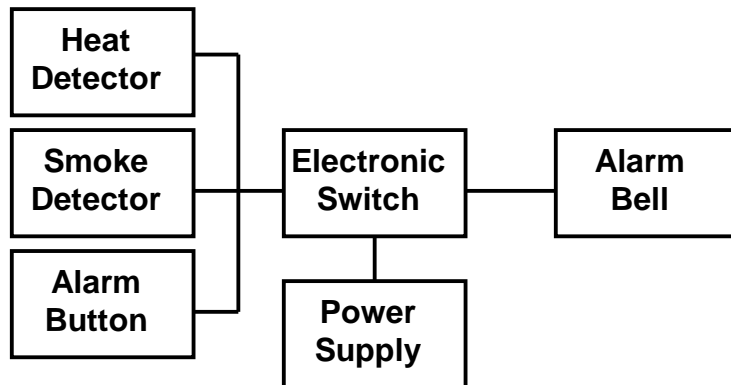
The EFNMS Certification of European Experts in Maintenance Management

Sample Questions from earlier Examinations

Part 2: “Reliability Performance of Production Plants” + “Maintenance Methods and Techniques”

3. (7 points)

In a building a fire alarm is connected as shown below. People are working in the building 50% of the total time. They will always detect a fire and they know what to do in such a case. A function check-out of the fire alarm system is carried out 1/year.



The different parts of the system have the following data

<u>Part</u>	<u>MTTF</u>	<u>MDT</u>
Heat Detector	20.000 hrs	10 hrs
Smoke Detector	20.000 hrs	11 hrs
Alarm Button	90.000 hrs	91 hrs
Electronic Switch	20.000 hrs	87 hrs
Power Supply	80.000 hrs	1 hr
Alarm Bell	80.000 hrs	125 hrs

- Draw a reliability block diagram for the fire alarm system.
- Calculate the probability (R) of a functioning system after 12.500 hrs.
- Propose two effective activities that will increase the availability of the fire alarm system. (One design improvement and one maintenance improvement.)

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Sample Questions from earlier Examinations

Part 2: “Reliability Performance of Production Plants” + “Maintenance Methods and Techniques”

4. (3 points)

You are going to propose some text regarding the maintenance aspects in a contract with a machine supplier.

- a) Which (one or more) of the following alternatives do you think is/are most important to recommend for such a contract?
 - b) Motivate your selection and why you not selected some alternative.
 - 1. It is good to have as many contractual requirements as possible to keep the manufacturer busy.
 - 2. The contractual requirements shall be possible to verify.
 - 3. The contractual requirements shall at 100% be equal to the users requirements.
 - 4. The contractual requirements shall imply a low or a reasonable risk for the manufacturer.

6. Make the markings of the result

Result of Part 1 "Management and Organisation" + "Maintenance Information Systems"

10th of November 2006

	1	2	3	4	5	6	7	8	9	10	11	12	Tot
	4 b	4 b	8 b	4 b	3 b	8 b	4 b	2 b	3 b	7 b	2 b	6 b	
<i>Anders Svensson</i>													
<i>Ulla Nilsson</i>													
<i>Nils Anderson</i>													

The first page of
the questionnaire

Tentamen över teoretiska kunskaper inom ledning av underhåll

Skriftligt prov i "Drift- och anläggnings säkerhet" samt "Underhållsmetoder"

Onsdagen den 1 februari 2006 kl. 14:00 – 17:30.

Denna tentamen innehåller 5 sidor med uppgifter och 15 sidor svarsblanketter.
(Kontrollera att Du har fått alla!)

Du kan maximalt uppnå 45 poäng. För att få godkänt erfordras minst 30 poäng.

ANVISNINGAR

Svaren skall lämnas på särskilda svarsblanketter. För varje svar skall anges uppgiftens nummer och tydliga avgränsningar skall framgå mellan olika uppgifter. Behövs fler svarsblanketter kan de fås av tentamensledningen. Inlämning får ske tidigast efter en halvtimme. (Ev senkomna deltagare bereds därmed möjlighet att delta i tentamen.)

Skriv ditt namn på samtliga svarsblanketter.

Resultatet av provet meddelas per post. Skriv därför Din postadress nedan.

Namn:

Personnummer: -

Adress:

Tel.: E-mail:

Mobil:

Det skriftliga provet i "Drift- och anläggnings säkerhet" samt "Underhållsmetoder"

är rättat den / 2006.

Maxpoäng: 45. Godkänd: 45 – 30 poäng. Uppnådda poäng:

For UTEK

EFNMS kontrollant

The final result
including the
signatures from
the National Examiner
and the ECC representative

7. Distribute the results

NOTE:

- * *Only information about those that passed the exam is public*
- * *Confidentiality regarding those that failed*

The letter with the result + included copies of the front pages of the questionnaires

Jonas Åkerlund
Torsgatan 58
113 37 Stockholm

Resultat av UTEKs tentamen den 06-09-13
över teoretiska kunskaper inom ledning av underhåll

Bäste Jonas,

GRATTIS TILL RESULTATET !

Bifogat återfinner Du resultatet av Din tentamen.

1. Du uppnådde 40,0 på provet i "Ledning och organisation" samt "Beslutsstöd" och blev därmed godkänd på det provet.
2. Du uppnådde 33,5 på provet i "Drift- och anläggnings säkerhet" samt "Underhållsmetoder" och blev därmed godkänd på det provet.
3. Du blev godkänd på provet i "Engelska språket avseende fackområdet Underhåll".

Detta innebär att Du har rätt att erhålla ett av UTEK utfärdat intyg.

OBS: För att erhålla det av UTEK utfärdade certifikatet, behöver vi erhålla underlag från Dig, som visar att du uppfyller de praktiska erfarenheter som krävs.

Får vi detta underlag och eftersom Du blivit godkänd i det engelska provet har Du därmed också rätt att erhålla det av EFNMS utfärdade certifikatet, och bli *Certified European Expert in Maintenance Management*. (Enligt EFNMS villkor skall Du inbetala SEK 1000:- (ca 100:- Euro) för att erhålla det europeiska certifikatet. Vi sänder Dig en faktura på detta sedan vi fått underlaget som visar att Du uppfyller de praktiska kraven.

Naturligtvis kan vi tillsända Dig intyg och certifikat per post, men vi vill gärna göra något extra av denna utdelning av certifikat någon gång under detta halvår. Vi återkommer om detta.

Med vänlig hälsning
Föreningen Underhållsteknik, UTEK

Jan Frånlund, ordförande

Föreningen Underhållsteknik UTEK

Postadress

UTEK

Box 10231

100 55 Stockholm

E-mail: utek@telia.com

Besöksadress

Bo Bergmansg. 11
Stockholm

Telefon

08 - 664 09 25

Fax

08 - 664 09 26

Hemsida: www.mentoronline.se/utek/

Företaget innehar

F-skatteseedel.

Org.nummer

802005-9377

Bankgiro

177-4231

Postgiro

579032-4

8. Delivery of Diplomas and Certificates



The **Diploma**
issued by the
National
Maintenance
Society

Den svenska riksorganisationen inom underhåll
Föreningen Underhållsteknik, UTEK
intygar härmed att

Jonas Åkerlund

vid en skriftlig tentamen
anordnad av UTEK den 1 februari 2006 visat sig
inneha den teoretiska kompetens som krävs av en

underhållschef

i enlighet med de krav och regler som fastställts av
European Federation of National Maintenance Societies,
EFNMS, den 17 april 1993

Göteborg, den 15 mars, 2006


Jan Frånlund
Ordförande i UTEK

Per Schjølberg
EFNMS kontrollant

The ECC
representative



The Chairman of the
National Maintenance
Society





Den svenska riksorganisationen inom underhåll

Föreningen Underhållsteknik, UTEK

intygar härmed att

Roger Nilsson

är en

Certifierad svensk expert
inom ledning av underhåll

i enlighet med de krav och regler som fastställts av
European Federation of National Maintenance Societies,
EFNMS, den 17 april 1993

Göteborg, den 15 mars, 2006

Jan Frånlund
Ordförande i UTEK

Gunnar Ericsson
1:e vice ordförande i UTEK

© Jan Frånlund 2014

The **National
Certificate**
issued by the
National
Maintenance
Society

The vice chairman
of the National
Maintenance Society

The Chairman of the
National Maintenance
Society

The **European
Certificate**
issued by the
EFNMS



The European Federation
of National Maintenance Societies

hereby certifies that

Kerstin Svensson

is a

**European Expert in
Maintenance Management**

in accordance with
our requirements and rules
adopted at the Council meeting
on the 17th of April, 1993

Stockholm, the 20th of April, 2005

Hans Overgaard, Chairman of the EFNMSvzw

Jan Frånlund, Chairman of the EFNMSvzw
European Certification Committee

Per Schjølberg, EFNMS Test Executor

The Chairman
of the ECC

The EFNMS
Chairman

The Chairman
of the National
Maintenance
Society

9. Analyse the result

<u>Pos</u>					
	DELTENTAMEN 1				
1	<u>Management and Organisation</u>				
2	Company manangement policy				
3	Company maintenance policy	1	8	5,95	74%
4	Maintenance goals				
5	Maintenance strategies	2	4	2,55	64%
6	"	5	4	2,68	67%
7	Maintenance activities requirements	6	3	2,00	67%
8	Organize maintenance activities	3	5	3,41	68%
9	Human and material resources				
10	Health & Safety, Environment conditions				
11	Guide, control and analyse the actiivities				
12	Develop and use key-figures	7	3	2,23	74%
	LCC/LCP techniques/methods	10	6	4,09	68%
	"	11	4	1,68	42%
	"	13	3	1,18	39%
13	Logistics support, spare part calculations				
14	Measure and analyse the results	8	2	1,55	77%
	" (<i>Maintenance economy results</i>)	9	8	2,00	25%
	Activities in the development and procurement				
15	Define future maintenance needs				
16	Define and implement human resources policy				
17	Actual European standards in maintenance				
18	Laws and regulations				
19	Contribution for production				
20					
	<u>Maintenance Information Systems</u>				
	Maint. Management Information Systems				
21	Planning, WO, Techn/Ec analysis, etc	4	4	3,45	86%
22	Documentation/Information systems	12	2	1,23	61%
23	Techn. Process control systems				
24	Expert systems				
25	Computer support				

DELTENTAMEN 2

28 Availability performance

Reliability	4	3	2,00	67%
"	8	7	2,92	42%
Maintainability	13	2	1,17	58%
Supportability				
Availability	1	5	3,25	65%
Improvements				
Mathematical & statistical formulas	11	4	0,75	19%
Human reliability	7	3	1,67	56%
Production safety				
Risk analysis	12	6	0,50	8%
Quality assurance	10	3	2,25	75%
Laws and regulations				

39 Maintenance Methods and Techniques

The theory of failure pattern				
Types of wear and tear	9	3	2,00	67%
Improvement techniques				
Preventive techniques	6	3	2,42	81%
Inspection techniques				
Condition monitoring techniques	2	2	1,67	83%
Methods of life extensions				
Measurement methods				
Control systems				
Performance improvement techniques	3	2	1,67	83%
Repair techniques	5	2	1,42	71%

1. Decide upon date for the exam, in co-operation with the ECC
2. Make the reservation of the examination room
3. Send out the invitation, including the price and the deadline for the registration

A recommended time schedule

● = The ECC representation

5. Perform the Examination

- 3 month

- 2 month

- 1 month

4. Make the questionnaires

The Exam

+ 1-2 days

+ 1 week

+ 1 month

At a suitable moment within 3 months

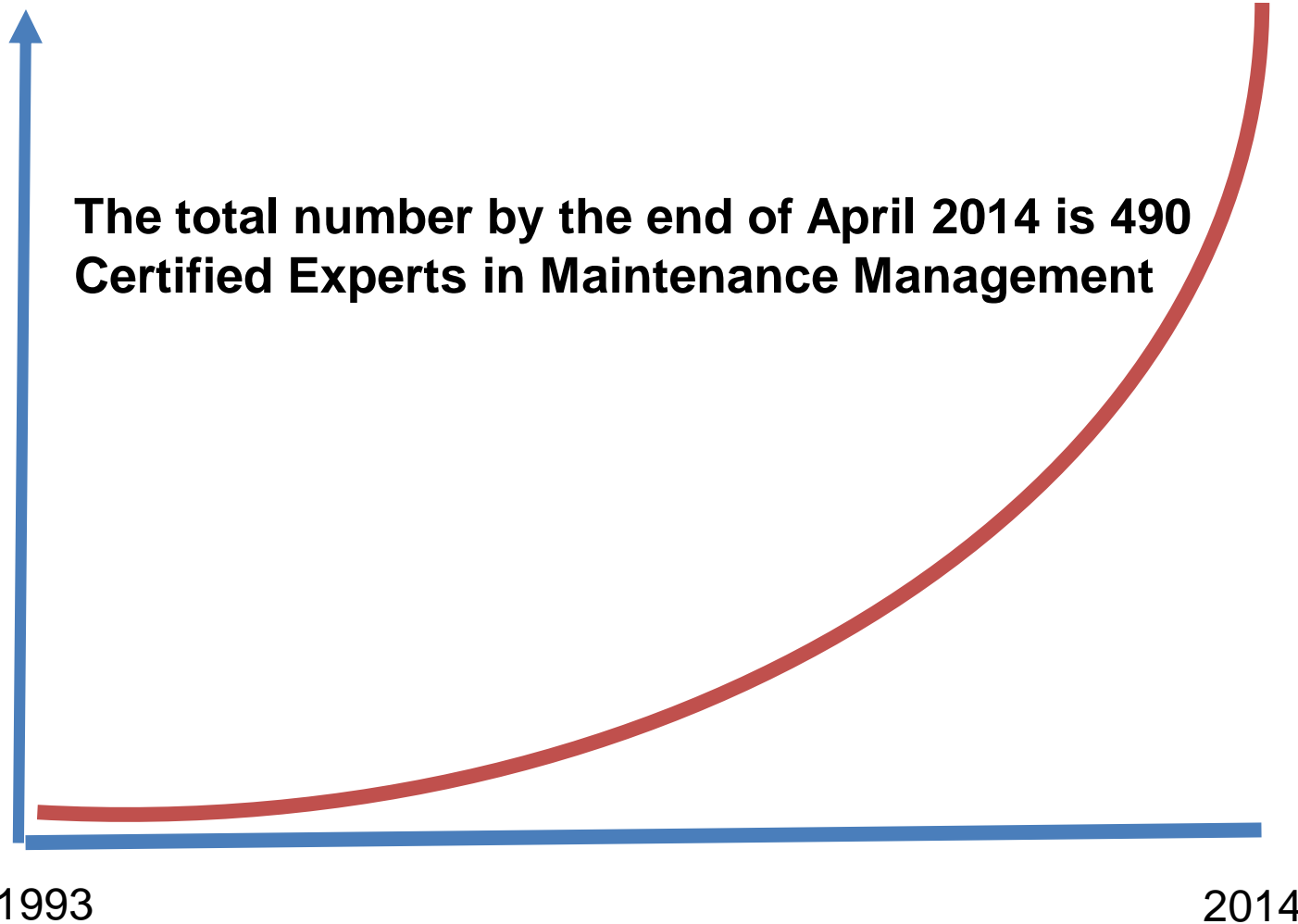
6. Make the markings of the result

7. Distribute the results

9. Analyse the result

8. Delivery of Diplomas and Certificates

The number of certified in Maintenance Management each year by the EFNMS 1993 – April 2014



Thank you!

Any questions?