



DIGITAL AND ENVIRONMENTAL SKILLS FOR FACILITY MANAGEMENT

OVERVIEW OF PROJECT TASKS COMPLETED
IN THE 4th SEMESTER,
1 April 2018 to 30 September 2018

Prepared by: BGFMA



THE DEFMA PROJECT

AIM

To develop and offer educational resources and materials to address the digital and “green” skill needs of facility managers, to strengthen their employability and keep up with the demands of the EU buildings sector.

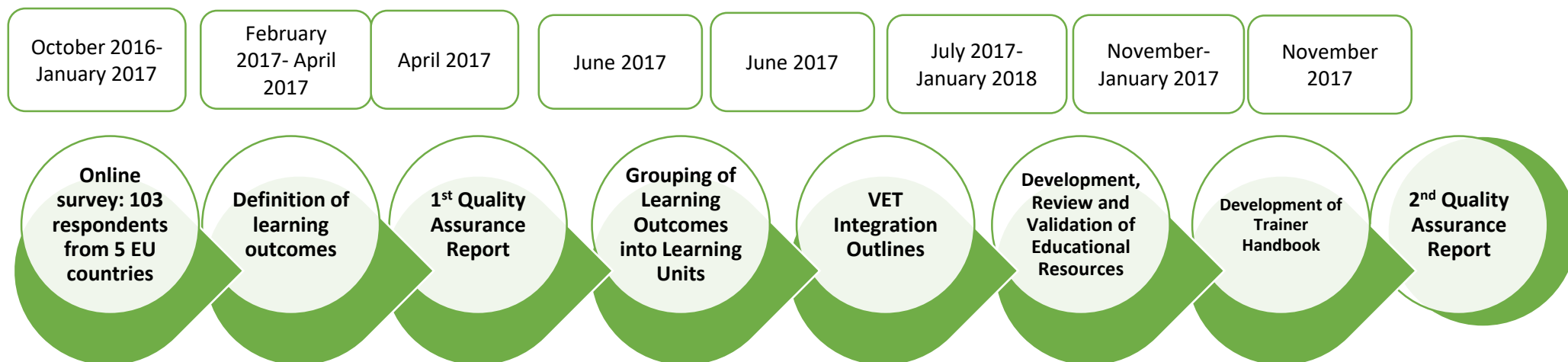
OUTPUTS

- Learning & assessment materials
- Massive Open Online Course (MOOC)
- Two workshops (UK, IT)
- Three Information Days (BG, GR, LT)

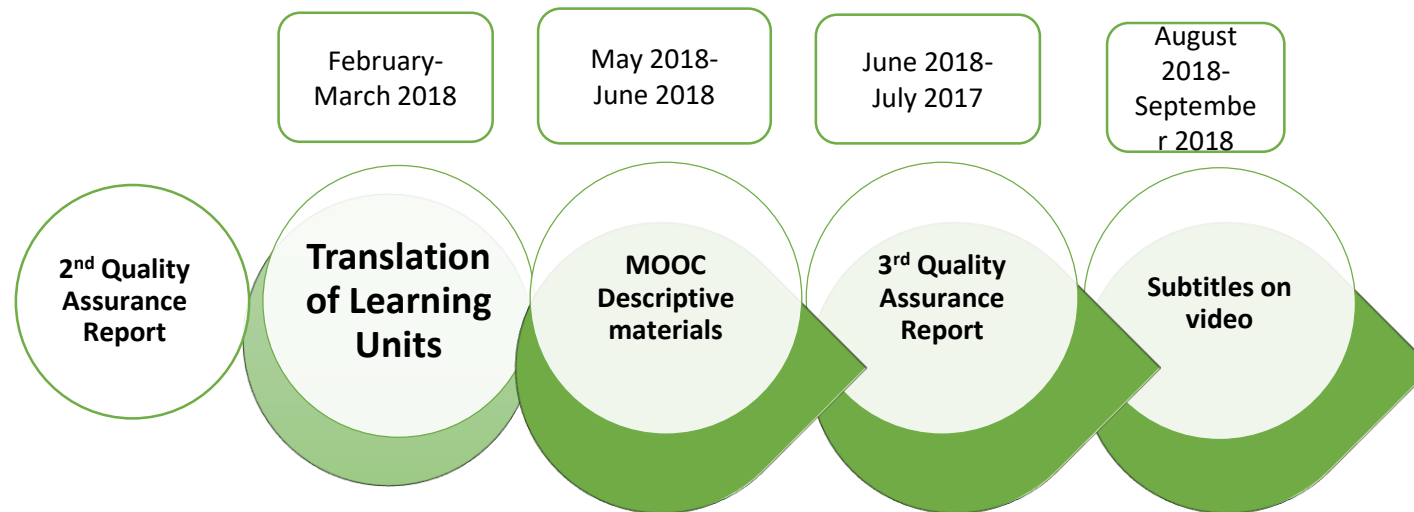
THE CONSORTIUM

1. SWC - South West College, UK
2. PROMEA – Hellenic Society for the Promotion of Research and Development Methodologies Astiki Etairia
3. SNS - National School of Services Foundation, Italy
4. BGFMA - Bulgarian Facility Management Association, Bulgaria
5. VSRC - Vilnius Builders Training Centre, Lithuania

Accomplishments since the start of the DEFMA project



Accomplishments since the start of the DEFMA project



DEFMA OPEN EDUCATIONAL RESOURCES

METHODOLOGY

- ❑ All teaching resources follow the outcomes of the analysis on occupational training requirements.
- ❑ Case studies and exercises have been presented to simulate real world requirements e.g. collecting, analysing and reporting on environmental information and data programming “smart” building controls to achieve energy cost savings.
- ❑ All materials will be evaluated and validated by project target groups and external experts in the demonstration workshops.
- ❑ Development of training resources and assessment materials based on the DEFMA units of learning outcomes.

TRAINING AND ASSESSMENT MATERIAL

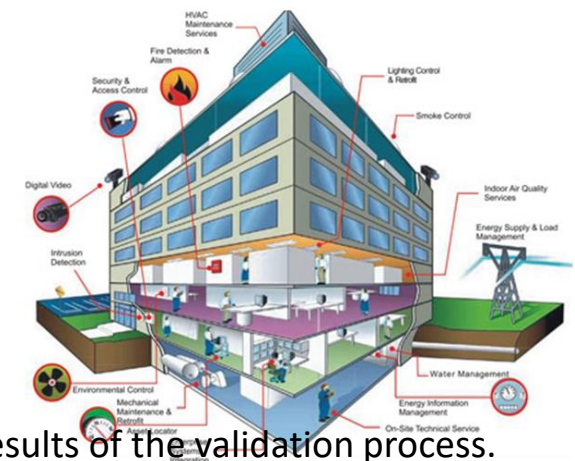
Training and assessment materials include:

- lecture notes/presentation slides (31)
- case studies (6)
- FAQs (45)
- multiple choice questions (66)
- practical exercises (42)

Partners: SWC: Development of educational resources and fine-tuning according to the results of the validation process.

SNS, BGFMA: Review and validate educational resources.

SNS, BGFMA, PROMEA, VSRC: Translation in own language.



DEFMA Learning Units

- Learning Unit 1:** Sustainability and environmental issues and their impact on FM
- Learning Unit 2:** Energy efficiency and energy management in buildings
- Learning Unit 3:** Sustainable buildings
- Learning Unit 4:** Building management and intelligent building solutions
- Learning Unit 5:** Maintenance and repairs to prevent energy losses
- Learning Unit 6:** Occupant & Operator Health and Wellbeing



Overall Course Description

Title	Digital and environmental skills for facilities management
Description	<p>Facility managers, after attending this course will be equipped with all needed skills, knowledge and competence in order to meet current and emerging workplace demands with regards to zero carbon services and technologies.</p> <p>During the course, learners will learn:</p> <ul style="list-style-type: none"> • Basic facts and principles of sustainability and environmental management for improving resource efficiency in buildings • Latest low and zero carbon technologies for buildings • Maintenance and repairs to prevent energy losses • Smart building controls • Communicating the sustainability agenda to the users' of the building • Health and Safety procedures with regard to environmental aspects
EQF level	5
Duration	120 NLT
ECVET credits	6
General prerequisites	<p>One of the following:</p> <ul style="list-style-type: none"> • Certificate in facility management, equal to or greater than EQF level 4. • 2 or more years of proven experience as facility manager.

Based on the European Qualification Framework descriptors of levels

Each ECVET credit equates to 20 notional learning hours

NLT (Notional Learning Time) includes teaching contact time (lectures, seminars, tutorials, laboratory practicals, workshops, fieldwork etc.), time spent on preparing and carrying out formative and summative assessments (written coursework, oral presentations, exams etc.) and time spent on private study



Learning Unit 1 Description

Title	Sustainability and Environmental Issues and their Impact on FM
Description	This learning unit introduces the learner to sustainability and environmental management and provides basic facts and principles that improve resource efficiency in or for buildings, covering different types of FM operations. It introduces to the key EU and national legislation on environmental issues.
Overall Learning Outcome	Learners should understand key concepts of the environmental and sustainability principles in order to develop a coherent and efficient saving energies policy. Also, learners should comprehend what EU and national environmental laws address and know which the main legislation covering the various topics related to energy saving practices for the building industries.
EQF level	4 - 5
Duration	20 hrs NLT
ECVET credits	1
Prerequisites	General
Assessment	1 assignment: case-study (5 open-ended questions and/or multiple choice test).
Learning Outcome 1	Describe the fundamental principles of environmental management and sustainability in relation to FM.
Learning Outcome 2	State at least 3 energy saving measures for buildings.
Learning Outcome 3	Explain how to manage and implement energy efficiency within the buildings in the short- and long-term.
Learning Outcome 4	State the main national and EU environmental policy principles (laws) on energy saving practices for the building industry.
Learning Outcome 5	Advise customers on how to improve resource efficiency in or for buildings.

Sustainability

- Sustainability has increasingly become a rising concern for all areas of life
- Increasing population size and living standards are resulting in degradation of earth's resources
- Developing need to “meets the needs of the present without compromising the ability of future generations to meet their own needs” Former Prime Minister of Norway, Gro Harlem Brundtland.
- Societal requirement to take Earth's carrying capacity into account across all sections of life
- Sustainable practices;
 - recognise the needs of everyone
 - protect the environment
 - carefully use natural resources
 - maintain high and stable levels of economic growth and employment

Environmental Management

The active management of society's impact on the environment.

- Balance the use of natural resources and unsustainable materials
- Pollution control
- Waste management
- Natural resource consumption
- Public health
- Recycling
- Compliance with environmental regulation
- Development and Implementation of Environmental management policies





Learning Unit 2 Description

Title	Energy efficiency and energy management in buildings
Description	This learning unit covers the processes and technologies applied in energy saving and carbon emissions reduction for buildings as well as the impacts from the use of energy saving practices. It introduces the learner to practical and cost effective ways of energy management, such as developing an energy policy and energy management plan.
Overall Learning Outcome	Learners should understand the role of the energy efficiency practices in buildings, appreciating the range of approaches and technologies available in order to select the appropriate strategy. Also, they should understand the importance of communication of the agenda to the users of the building.
EQF level	4-5
Duration	20 hrs NLT
ECVET credits	1
Prerequisites	General+ Learning Outcomes of Learning Unit 1
Assessment	1 assignment: case-study (5 open-ended questions and/or multiple choice test)
Learning Outcome 1	Describe the fundamental principles of environmental management and sustainability in relation to FM.
Learning Outcome 2	Explain no-cost vs. low-cost energy saving measures for buildings.
Learning Outcome 3	Evaluate the impact of integrating energy saving measures in buildings.
Learning Outcome 4	Prepare energy management plan.
Learning Outcome 5	Advise customers on the use and impact of smart energy saving solutions.

Energy efficiency and energy management in buildings

Advantages of Sustainability and Environmental Management

- Reduces Carbon Footprint
- Reduced operating costs
- Marketing advantage over competitors (ecological way of thinking)
- Shows due diligence of the organisation
- Reduces long term reliance on fossil fuels
- Increase long terms robustness and reduce vulnerability with respect to utilities cost
- Raises the profile of the FM department





Learning Unit 3 Description

Sustainable Building

Title	Sustainable Buildings
Description	This learning unit introduces the learner to the concept of sustainable building and provides basic facts and principles on efficient use of energy, water and other resources; waste reduction; indoor environmental quality enhancement; operations and maintenance optimisation; building rating & certification systems.
Overall Learning Outcome	Learners should develop innovative thinking in the design and operation of buildings and be able to analyse and evaluate sustainable design options for buildings.
EQF level	4-5
Duration	20 hrs NLT
ECVET credits	1
Prerequisites	General+ Learning Outcomes of Learning Units 1&2
Assessment	1 assignment: case-study (5 open-ended questions and/or multiple choice test)
Learning Outcome 1	Explain the concept of sustainable building and the existing building certification systems.
Learning Outcome 2	State the main energy concepts for heating & cooling.
Learning Outcome 3	Explain waste management & reduction processes.
Learning Outcome 4	Describe the ways to enhance the indoor air quality.
Learning Outcome 5	Advise customers on operations and maintenance optimisation.

Environmental benefits:

- enhance and protect biodiversity and ecosystems
- improve air and water quality
- reduce waste streams
- conserve and restore natural resources

Economic benefits:

- reduce operating costs
- create, expand, and shape markets for green product and services
- improve occupant productivity
- optimize life-cycle economic performance

Social benefits:

- enhance occupant comfort, workforce productivity and health
- heighten aesthetic qualities
- minimize strain on local infrastructure
- improve overall quality of life"



Learning Unit 4 Description

Title	Building management and intelligent building solutions
Description	This learning unit explains how to utilise complex building information & maintenance technology systems and to operate these to ensure the highest building performance.
Overall Learning Outcome	Learners should appreciate the role of the digital innovation for energy efficiency maintenance and quality, health & safety issues in building in order to apply proper solutions to energy saving.
EQF level	4 - 5
Duration	20 hrs NLT
ECVET credits	1
Prerequisites	General + Learning Outcomes of Learning Units 1, 2 & 3
Assessment	1 assignment: case-study (5 open-ended questions and/or multiple choice test)
Learning Outcome 1	Describe the importance of Building Management Systems in Facility Management.
Learning Outcome 2	State the general requirements to implement smart metering technologies in or for buildings.
Learning Outcome 3	Explain the purpose of a building log book and how to develop it.
Learning Outcome 4	Identify health and safety issues for buildings that include energy monitoring technologies and services.
Learning Outcome 5	Advise customers to ensure the correct selection of smart metering system.

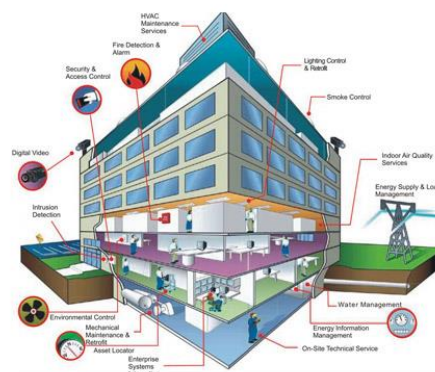
Building Management and Intelligent Building Solutions

- Building management aims to manage the environment within a building so that the use of energy perfectly balances with the use made of it, so as to optimise both. This could involve distributing and managing the level of heating, cooling, lighting and ventilation, to suit the changing levels of activity within different areas throughout the day, week or year. The power used by machinery and processes can then be managed more effectively.
- Poor control of heating, ventilation, cooling and lighting is responsible for excessive energy consumption in many buildings. Having better control over working areas helps to produce a consistently comfortable environment for building occupants.

Smart buildings

A smart building is an automated building designed, installed and operated with advanced and integrated building technology systems.

Smart Buildings are critical in the rational use of resources (water and energy). Automated systems, such as HVAC and lighting control, power management and metering play a major role in determining the operational inefficiency of a building.





Learning Unit 5 Description

Title	Maintenance and repairs to prevent energy losses
Description	This learning unit introduces the learner to technical issues related to the installation of energy saving technologies and services in new and existing buildings, detecting faults and performing the necessary repairs.
Overall Learning Outcome	Learners should be able to apply the proper tools to detect heat, water and air losses in buildings in order to rectify small faults and carry out simple maintenance to increase energy efficiency. Also, learners should understand the technical skills required to incorporate smart metering technologies in automated home infrastructures.
EQF level	5
Duration	20 hrs NLT
ECVET credits	1
Prerequisites	General + Learning Outcomes of Learning Units 1,2, 3, 4
Assessment	1 assignment: case-study (5 open-ended questions and/or multiple choice test).
Learning Outcome 1	Describe the main principles and tools for detecting heat, water and air losses in buildings.
Learning Outcome 2	Explain the technical issues related to repair and maintenance of building systems to increase energy performance.
Learning Outcome 3	Identify health and safety issues during repair and maintenance operations.
Learning Outcome 4	Explain the technical issues related to incorporating smart metering technologies in automated home infrastructures
Learning Outcome 5	Evaluate the impact of the interconnection of smart meters with other home infrastructure.

Installation of energy saving technologies and services in new and existing buildings.
Detecting faults and performing repairs

Routes of heat&cold, water and air loss from buildings

Heat & Cold loss routes

- Walls
- Floors
- Windows/Facade
- Roof
- Entrance doors
- Uncontrolled air movement
- Ventilation/Extraction systems

Water loss routes

- Leaks (pipes)
- Overflows
- Drainage system
- Condensation
- Heat exchangers
- air handling units

Air loss routes

- Roof voids
- Service penetrations
- Unsealed stud/partition walling
- Windows/Facade, doors and other weather seals
- Unsealed flooring systems
- HVAC systems



Learning Unit 6 Description

Title	Occupant & Operator Health and Wellbeing
Description	This learning unit introduces the learner to the main health and wellbeing aspects relevant to FM operations that focus on respecting the environment through efficient integrated waste, energy and water management, and managing the carbon emissions generated by FM activities.
Overall Learning Outcome	Learners should understand key rules and requirements for Health & Wellbeing when organising and performing facility management operations, securing total customer satisfaction through the use of innovative technology and organizational excellence in a sustainable and environmental friendly manner.
EQF level	4 – 5
Duration	20 hrs NLT
ECVET credits	1
Prerequisites	General+ Learning Outcomes of Learning Units 1,2, 3, 4&5
Assessment	1 assignment: case-study (5 open-ended questions and/or multiple choice test)
Learning Outcome 1	State the main principles for keeping optimum thermal comfort and indoor air quality.
Learning Outcome 2	Explain potential areas of risk in the workplace and how to take action to minimise the threat.
Learning Outcome 3	Describe environmental safety measures.
Learning Outcome 4	Advise customers on environmental, health and safety questions.

Thermal Comfort

Factors determining for Thermal Comfort:

- Clothing/Insulation
- Air Speed
- Humidity
- Metabolic Rate
- Radiant Temperature
- Air Temperature

Environmental Safety Measures

- Air emissions and ambient air quality
- Energy conservation
- Wastewater and ambient water quality
- Water conservation
- Hazardous materials management
- Waste management
- Noise
- Contaminated land



TRAINER HANDBOOK

Toolkit will assist trainers in designing and running a training program for facility managers.

Trainer manual will provide guidelines on how to deliver training with the use of the DEFMA training material and assessment tools for each learning unit.

Toolkit will include instructions on how to develop additional material and resources in accordance with DEFMA learning outcomes.

DEFMA trainer handbook will also contain detailed:

- case studies
- practical exercises
- background reading





Development of additional pedagogical materials

Key Outputs

O4-A2: DEFMA Massive Open Online CoMOOC course - Development of additional pedagogical MOOC materials.

Unit 1 – Video presentation of lecture notes/presentation slides

Unit 2 – Video presentation of lecture notes/presentation slides

Unit 3 – Video presentation of lecture notes/presentation slides

https://drive.google.com/open?id=1vHyPt2bC5g8NIY1f_yfPFwknwB2V7Pvx

Unit 4 – Video presentation of lecture notes/presentation slides

Unit 5 – Video presentation of lecture notes/presentation slides

Unit 6 – Video presentation of lecture notes/presentation slides





KEY OUTPUTS

O4-A2: DEFMA Massive Open Online Course - Development of additional pedagogical MOOC materials.

Video 1 – Building Fabric

https://drive.google.com/file/d/14lkt7dFTx1_J1aic-8VWkydYH8_AOfzs/view

Video 2 – Mechanical Heat Recovery Ventilation

Video 3 – Air to Water Heat Pump Technology

Video 4 – Solar Photovoltaic Technology

Video 5 – Biomass Heating Technology





KEY ACTIVITIES

O4-A2: DEFMA Massive Open Online Course - Development of additional pedagogical MOOC materials.

Video 1 – Interactive Building Tour of the CREST passive pavilion

Video 2 – Virtual / Augmented Tour of the Erne Campus building

<https://www.youtube.com/watch?v=PgZHKm3EeMo>

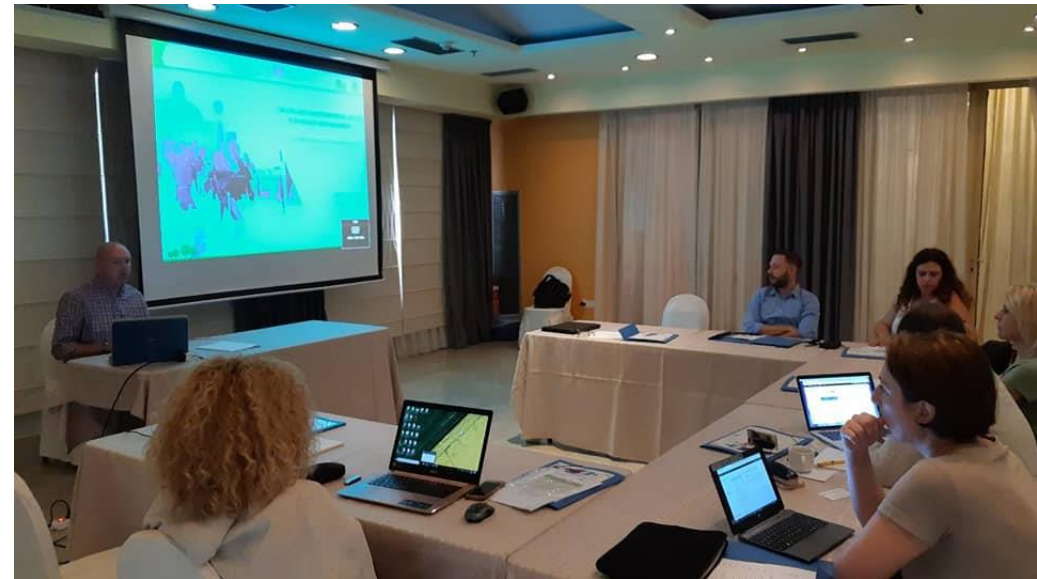
<http://www.swc.ac.uk/innovate/crest/home>

<http://www.swc.ac.uk/crest%20tour.html>



4TH TRANSNATIONAL PROJECT MEETING

PROMEIA hosted the 4th TPM that took place on 4th July 2018 in Athens. The meeting gathered together all partners in the DEFMA Consortium.



- Meeting was very productive;
- Outlined the results of the project since its beginning back in October 2016;
- Outlined the forthcoming tasks.
- Next TPM will be held in January 2019, in Enniskillen, NI.



DEFMA DISSEMINATION ACTIVITIES

Ongoing social media interactions.

Direct contacts, incl. face-to-face meetings

Presentations at third party events

Regular information in newsletters

You Tube Channel as part of the social media activities



FORTHCOMING DEFMA ACTIVITIES

**Demonstration workshop in
Italy**

**Demonstration Workshop in
the UK**

Information Day in Greece

**Information Day in
Bulgaria**

Information Day in Lithuania





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