EXCELSIOR: a European Horizon 2020 Teaming project for the establishment of a Centre of Excellence in the Eastern Mediterranean for Earth surveillance and space-based monitoring of the Environment

HADJIMITIS D.G.¹, SCHREIER G.², KONTOES H.³, VINCENT A.⁴, ANSMANN A.⁵, KOMODROMOS G.⁶, MAMOURI R.¹, THEMISTOCLEOUS K.¹, MICHAELIDES S.¹, NISANTZI A.¹, PAPOUTSA C.¹, TZOUVARAS M.¹, METTAS C.¹, CHRISTOFE A.¹, PAPOUTSIS, I.³, MELILLOS G.¹, NEOCLEOUS, K.¹ and EVAGOROU, E.¹.

1. CYPRUS UNIVERSITY OF TECHNOLOGY 2. DLR 3. NOA 4. NASA 5. TROPOS 6. MINISTRY OF TRANSPORT, COMMUNICATIONS & WORKS (CY GOVERNMENT)
Overview

• Project Details
• The idea behind (upgrade the existing group)
• Excelsior’s vision- Proposed activity in the Eastern Mediterranean and Middle East (EMME) and Middle East and North Africa (MENA).
EXCELSIOR’s details

Funded under H2020
Pillar: Spreading excellence and widening participation
Work Programme Year: H2020-2016-2017
Work Programme Part: Spreading Excellence and Widening Participation
Call: H2020-WIDESPREAD-2016-2017
Topic: H2020-WIDESPREAD-04-2017-TeamingPhase1
Type of action: CSA (Coordination and support action)
Project GA number: 763643
Proposal acronym: EXCELSIOR
Total Budget: 400,000 €
Duration: 12 months
End: 31 August 2018

December 2018 (results)......35 million euros for the next 7 to 15 years
[15 millions from the EC, 15 millions from Cyprus Government, 4-5 millions from the University]
EXCELSIOR’s consortium

Cyprus University of Technology — CY [coordinator]

German Aerospace Centre — DE

National Observatory of Athens — GR

Leipzig Institute for Tropospheric Research — DE

Ministry of Transportation, Communications and Works, Department of Electronic Communications — CY
The idea behind to upgrade and further promote the existing ‘Remote Sensing & Geo-Environment’ Group /ERATOSTHENES Research Centre, established within the Cyprus University of Technology, into a sustainable, viable and autonomous Centre of Excellence for Earth Surveillance and Space-Based Monitoring of the Environment (EXCELSIOR), which will provide the highest quality of related services both on the National, European and International levels.

The long term aim of the centre is to create new opportunities for innovative ground-breaking research and promote Cyprus to the European Research Area in the field of systematic monitoring of environment using earth observation, space and ground based integrated technologies.
EXCELSIOR’s idea

Remote Sensing & Geo-Environment Lab
Department of Civil Eng. & Geomatics
2007

TIME TO UPGRADE

ERATOSTHENES Research Center
2017

ERATOSTHENES: Excellence Research Centre for Earth Surveillance and Space-Based Monitoring of the Environment
but what is ERATOSTHENES?


- Collaboration with governmental departments
- Collaboration with industrial partners
- Provide practical solutions to several problems
- Promotion of earth observation, space technologies, navigation, positioning to stakeholders
- RSCY/ SPIE international conferences 2013, 2014, 2015, 2016, 2017...
- Participation with consortiums on European and international level (space calls, earth observation, environment, transport, security etc)
The Group
(ESA visit at the Lab)
The Lab

- Field Spectroradiometers: 2 GER 1500, 1 SVC 1024, 1 GER1500i, 1 ASD
- Underwater enclosure
- Sun-photometers: 2 Microtops
- Software: ERDAS Imagine, ER Mapper, Apollo, ENVI, Mapinfo, ArcGIS etc.
- Calibration Device
- 1 Automatic CIMEL Sun Photometer (AERONET/NASA)
- 1GPR MALA
- GPS
- NDVI Camera
- PM10 / Met Stations
- Lidar
Resources

- UAV systems
- Laser Scanner
- Digital cameras (Vis – NIR – Thermal)
- GPS
- Georadar
- GIS – RS softwares
• **GNSS Receivers**
  - 1 GNSS Reference Station (GPS1200)
  - 8 Leica Viva GS15
  - 10 Spectra Precision Mobile Mapper receivers
  - 2 Leica CS15 Plus Mapping Tablets
  - 3 High Sensitivity u-blox evaluation receivers

• **Inertial Navigation Systems**
  - 1 SBG Ellipse-N
  - 1 u-blox DR6

• **Laser Scanner**
  - Leica C10

• **Geodetic Equipment**
  - 10 Leica TCR 1203+ R400
  - 10 Leica Sprinter 150
  - 1 Leica Sprinter 250
The ‘Remote Sensing & Geo-Environment’ Group /ERATOSTHENES Research Centre, is COPERNICUS Academy member and member of the European Association of Remote Sensing Laboratories (EARSeL). EARSeL is a scientific network of European remote sensing institutes, coming from both academia and the commercial/industrial sector.

The Copernicus Academy will connect European universities, research institutions, business schools, both private and non-profit organizations, in the Participating Countries of the Programme and beyond. The Academy Network will also work to increase the exchange of ideas and best practices across borders and disciplines while contributing to the development of the use of Earth Observation data in general and Copernicus data and information in particular, in various public or private user organizations or industries.
EXCELSIOR

ERATOSTHENES: Excellence Research Centre for Earth Surveillance and Space-Based Monitoring of the Environment

NETWORKS

- NASA
- ESA
- EARSeL
- SPIE
- EARLINET
- ACTRIS
- GEO
- DLR
EXCELSIOR
ERATOThENES: Excellence Research Centre for Earth Surveillance and Space-Based Monitoring of the Environment

CUT-TEPAK AERONET

ACTRIS
Network

CUT-TEPAK EARLINET LIDAR
Cypriot collaborations
European collaborations

>300 Universities & Research Centers

- Imperial College London, (GB)
- University of Surrey, (GB)
- University College London, (GB)
- Southampton University, (GB)
- Aberdeen University, (GB)
- Cranfield University, (GB)
- University of Edinburgh, (GB)
- University of Sheffield, (GB)
- University of Pavia, (I)
- Delft University, (NE)
- Politecnico di Milano (IT)
- CNR (IT)
- Swiss Federal Institute of Technology (ETH), (CH)
- Norwegian University of Science and Technology, (NO)
- Instituto Superior Tecnico, (P)
- University of Porto, (P)
- Aalborg University, (DK)
- Aristotle University of Thessaloniki, (GR)
- National Technical University of Athens, (GR)
- National Observatory of Athens, (GR)
- Federal Institute of Material Research and Testing, (DE)
- Swiss Federal Laboratories for Materials Testing and Research for Industry, (CH)
- Ecole Nationale Supérieure des Télécommunications, (FR)
- TROPOS Institute (DE)
Beyond Europe collaborations

Asia
- Tokyo University, Japan
- Kyoto University, Japan
- Kansai University, Japan
- University of Osaka City, Japan
- Chinese Academy of Sciences, China
- Hong Kong Polytechnic University, HK
- University of Malaysia-Sabah

USA
- Colorado School of Mines
- Harvard University
- University of Colorado
- Stanford University
- Georgia Tech
- Lehigh University
- University of Buffalo
- California State University

Australia
- Newcastle University of Australia, Australia
- University of Western Australia, Australia
- Queensland University, Australia
Funding

- Participation to more than 60 projects from since 2007
- Coordination of more than 20 funded research projects

Research

- 30 active researchers coming from different backgrounds such as engineers; physics; earth scientist; chemists, surveying engineers, geologists, archaeologists etc working in 6 different thematic research areas of the Lab
- Provide 120 job positions since 2007
- More than 100 dissertations/ final year projects
- Phd Supervision (more than 15 since 2007)
The Group has received funding for over 60 Competitive Research Programs since 2007

1. Cyprus Research Promotion Foundation
2. European Union
3. Industry
Applications / Activities / Funded Projects

- Archaeology / Cultural Heritage
- Real Estate
- Marine Spatial Planning
- Utilities
- Water Resources Management
- Mapping
- Irrigation Demand / Agriculture
- Infrastructure
- Water Quality monitoring
- Education
- Forestry
- Navigation
- Air Pollution
- Water leakages monitoring
- Climate Changes
- Natural Hazards (Floods, earthquakes, fires etc)
- Aerosol Typing
- Disaster Management
- Aerosol/Cloud interaction
- Defense & Security
- Transport
- Crisis Management
- Tourism
- Crisis Management
- Bathymetry
- Landslides
- Positioning
- Safety of Life
- Navigation
- Animal Tracking
- ....selected projects
FORESTRY (Mapping, Signatures)

Landsat 8, 24 Ιουλίου 2016 / SOLEAS CYPRUS

AOI
16,02 sq. km²
Mapping of burned areas in Solea using Sentinel-2
28/6/2016
16.4 sq.km2
(7-5-3)
Data collected from the smart buoy was used for furthermore calibration of the retrieved algorithm due to high frequency of measurements collected.
LAND: Irrigation demand - Agriculture

Integration of:
- Spectroscopy
- Micro-sensor technology
- Remote sensing

- Satellite imagery: retrieval of surface reflectance/temperature
- Spectroradiometric measurements: retrieval of ground reflectance
- Micro-sensors: soil moisture, temperature, RH etc.
- Irrigation models
Air: Aerosol-Cloud Interaction

Range-corrected signal at 1064nm, PollyXT_NOA, C34

Polarization lidar methodology

INPs
5000 L⁻¹
1000 L⁻¹
2 L⁻¹

Doppler lidar methodology

>10000 L⁻¹ INPs
10-20 L⁻¹ ICs

2-10 L⁻¹ INPs
0.2-2 L⁻¹ ICs

INPs
1-10 L⁻¹

0.2-0.5 L⁻¹ ICs

Cy-CARE campaign
BACCHUS project

Disdrometer (rain)
Cloud radar (clouds and rain)
Doppler lidar (wind speed)

Microwave radiometer (water vapor)

Raman lidar (aerosol and dust)

TROPOS
Leibniz Institute for Tropospheric Research
Risk analysis: Flood risk

Integrated Use Of Satellite Remote Sensing And Hydraulic Modeling For The Flood Risk Assessment At A Catchment Scale In Cyprus

Funding (200,000 euros), Cyprus Research Promotion Foundation, Structural Funds
Partners: Cyprus University of Technology (Coordinators), Technical University of Crete, National Observatory of Athens, Cyprus Meteorological Service, Water Development Department
Marine Spatial Planning (MSP) (blue growth)

Main aim of the project is the joint development methodology, process and suitable implementation framework for Marine Spatial Planning.

Consortium: DEPARTMENT OF MERCHANT SHIPPING, DEPARTMENT OF LANDS AND SURVEYS, UNIVERSITY OF THE AEGEAN, MINISTRY OF MARINE AND AEGEAN, CYPRUS UNIVERSITY TECHNOLOGY, OCEANOGRAPHY CENTRE
Urban heat

Study the urban heat island effect in Cyprus based on both multi-temporal satellite and meteorological data.

Figure 16. UHI estimated from MODIS Aqua nocturnal images for (a) 31 July and (b) 28 August 2010, for the four urban areas of Cyprus, separately.

Funding: Cyprus Research Promotion Foundation
Partners: Meteorological Department, National Observatory of Athens
Earth observation for Cultural Heritage (detection, management, protection etc)

Our proposed equation from a GeoEye example (Ilis archaeological site in Greece)
Detection of Unexcavated buried remains

Fusion of RS data
HAZARDS

USE OF A GEOSPATIAL EARLY-WARNING DECISION SUPPORT SYSTEM TO PREPARE FOR DISASTERS OR PLAN FOR MULTIPLE HAZARDS: DECATASTROPHIZE”

• The development of a geo-spatial early-warning decision support system that will be connected to Emergency Operation Centers (EOC) and Operational Resources (OR)

Co-financed by the EU-Union Civil Protection Mechanism
Project number: ECHO/SUB/2015/713788/PREP
Static fire models
(Creation of maps)

Dynamic flood model
DECAT software: It is made up of three emergency management phase:

1. Early warning
2. Impact assessment
3. Emergency management – mitigation of impact

End user of the software: Cyprus Civil Defence
The Group has strong expertise in Atmospheric correction methods: Development & assessment

\[ \rho_{ts} = c + m \cdot \rho_{tg} \]

- ‘at-satellite reflectance’
- ‘atmospheric path radiance’
- ‘ground reflectance’
EU opportunities for widening EXCELLENCE...

Widening consists of three main actions, i.e. **Teaming**, **Twinning** and ERA Chairs.

**ERA Chairs stands for excellence to institution.**
Outstanding academics, with proven research excellence and management skills, with potential for research excellence.

**Twinning stands for institutional networking.**
Transfer of Knowledge

**Teaming means institution building.**
Teaming projects create new or update existing centres of excellence in Widening countries through a coupling process with a leading scientific institution.
The Group is coordinating a Twinning project:
Remote Sensing Archaeology Centre of Excellence -
ATHENA

ATHENA: a funded project under the H2020-TWINN-2015 (www.athena2020.eu)

The Centre aims to be in close collaboration with both national as well international research institutes and stakeholders, providing integrated remote sensing services and solutions in the area of the Eastern Mediterranean. The new perspectives on archaeological and cultural heritage in the region will position ATHENA as a centre of knowledge and a standard lab in the field of Remote Sensing Archaeology.
And now.....the teaming project
The pathway towards to a Centre of Excellence
EXCELSIOR’s Structure: WPs

WP1: Project management

WP2: Strategic Positioning

WP3: Outreach and Dissemination

WP4: Formulation of the Business Plan
The existing Remote Sensing & Geo-Environment Group (Eratosthenes), being the only established laboratory in Cyprus for space-based earth observation, possesses significant experience on Earth Observation, Remote Sensing, as well as sophisticated instruments and models that are needed to systematically observe, understand, protect, monitor and predict environmental parameters in land, water and air.

DLR will support the planning and establish a satellite receiving station including attached processing and archiving functions with the possibility of a direct data flow into EO-based services and networks.

NOA will seek to establish sustainable links between ERATOSTHENES CoE, and the BEYOND Centre of Excellence, that is established in the European Research Area as a regional Copernicus node for EO-based monitoring.

TROPOS will be the key partner for the establishment of a ground based Remote Sensing station in ERATOSTHENES CoE, providing the close links between European networks and satellite validation activities.

DEC-MTCW will provide the links to the local and governmental community and promote the space issues on the national level.

The integration of novel technologies in the areas of Remote Sensing and space-based earth observation techniques, along with the use of Geographic Information Systems (GIS), can assist in a more sustainable and systematic monitoring of areas of interest and the on-time detection of risks, with the ultimate goal to protect the environment, providing critical information, through end user products, not only to policy makers and other local, national and regional authorities but also to citizens and tourists.
Why Space technologies?

Research, Products and Services generated by Space technologies has the capacity to mobilise R&I and development and to boost the economies not only in Cyprus but in the entire Middle East region.

The satellite data requires processing and, more importantly, “fine-tuning” towards the needs of the local users and their specific context in all branches of environmental monitoring, including climate change and emergency management.

The Centre of Excellence will provide added value both in Cyprus and in Europe by strategically positioning itself as a leader in space industry services in the region as a result of its focus on remote sensing, Earth observation and satellites technologies, its advancements in environmental science and through its alignment with the Smart Specialization Strategy of Cyprus (S3Cy).
In relation to the **Copernicus trend**, which provides products and services on Land, Marine and Atmosphere monitoring as well as on Emergency management, Security and Climate Change, **ERATOSTHENES CoE** is organized in 3 main research thematic areas, i.e. Land, Water and Air. (Natural Hazards, Agriculture, Forestry, Water Resources, Energy etc)

**NATURAL & BUILT ENVIRONMENT**

These three thematic Research Areas of the CoE **embrace all six Copernicus services and interact with the priorities of S3Cy**
why Cyprus?

Cyprus’s unique geostrategic position can support Earth Observation from satellites programmes in three continents and provide valuable services in the satellite calibration and validation processes.

The ERATOSTHENES CoE – with its expertise and infrastructure (e.g., prospectively its own satellite receiving stations and a state of the art ground based remote sensing station) - could further complete the existing network of international ground stations.

The EXCELSIOR’s vision and the geostrategic position of Cyprus

EARSEL FOREST FIRES SIG WORKSHOP, CHANIA 25/9/2017
The priorities of the Centre of Excellence

The Horizontal Priorities of the ERATOSTHENES CoE are:

- to promote Sustainable Development, based on exploitation of natural resources in respect and safeguard of the environment;
- to extend innovation in the field of Satellite Remote Sensing techniques and their integration with other geo-spatial data;
- to promote and enhance use of ICT-based tools and services oriented towards monitoring and protection of the environment (including air, land and water domain).

The Vertical Priorities of the ERATOSTHENES CoE are:

- to promote knowledge on general benefits deriving from space-based products and services for non-space sectors;
- to experiment and promote basic and applied research in domain of remote sensing technologies for the benefits of environment monitoring;
- to optimize the citizens experience in terms of everyday space-based ICT systematic services and applications.
EXCELSIOR
ERATOSTHENES: Excellence Research Centre for Earth Surveillance and Space-Based Monitoring of the Environment

ERATOSTHENES CENTER OF EXCELLENCE

Innovation
Research
Services
Products
Education
Culture

Pillars

Remote Sensing Resource Data Center
Satellite Images
UAV/Aerial Field Data

Environment
Water
Water Quality
Water Management
Water Resources
Land cover changes
Climate Change
Desertification
Ecosystems

Atmosphere
Atmospheric monitoring
Air Pollution
Air Quality

Agriculture
Crop yield
Precision Agriculture
Irrigation Management

Hazards
Earthquakes
Fires
Landslides
Hoods
Coastal Erosion

Cultural Heritage
Archeoaclandscapes
Archaeology
Monuments

Build Environment
Smart Cities
Urban Heat

Blue Growth
Coastal management
Maritime Spatial Planning

Defense & Security
Detection
Border Monitoring

Business Center
Research
Government
Industry
Education

EARSEL FOREST FIRES SIG WORKSHOP, CHANIA 25/9/2017
Expected impact on National economy and society

- Provide **new job opportunities** for highly educated researchers in Cyprus
- Establish new Departments of the Centre that will improve and expand current research capabilities
- **Foster mobility among researchers** (towards and from the Centre) with other universities, research centre and private sector
- **Strengthen the relationship with industrial sector** through specific agreements with local SMEs in EO domain regarding research exchange, collaboration on patents and creation of spin-offs
- **Develop and disseminate integration tools** to fully exploit the use of multiple remote sensing techniques at ground-based stations, in particular for the calibration/validation/integration of satellite sensors
- **Maintain and enhance capacity of training** in the field of EO particularly directed to new users including those from non-EU developing countries
The upgrading of the existing ERC into a CoE will be accomplished through a close interaction with a selection of the key partners (DLR, NOA, TROPOS) by taking advantage of their excellence in the topics addressed by the project. There is a strong collaboration between the partners for the last 5 to 10 years.

EXCELSIOR will take full advantage of such partnerships with EU-leaders already well founded on their proven efficient collaboration through existing long standing partnerships in other EU funded and ESFRI projects.

Networking, combined with experience in proposal preparation/coordination, and strong links as well as deep engagement of different stakeholders, is the key for continuous funding attraction and maintenance and enhancement of capacities.
Partners contribution

**DRL**
Space Technologies (Environmental monitoring)
Sustainable links to policy makers and business
Support in planning and setting up a satellite receiving station
Support on knowledge and build capacity in EO methods
Support in designing, developing and Implementing of services based on earth observation and other geospatial data

**NOA**
Connecting to the Sentinel Collaborative Ground Segment
Plugging in to the key EO & geospatial Data Hubs.
Know-how transfer of expertise on organization of big data archives, systematic distribution and dissemination of space and geospatial data.
Support the linking with international initiatives (Copernicus, GEO, ESA, CEOS)

**TROPOS**
Support the development, design, and realization of an infrastructure for state-of-the-art ground-based remote sensing.
Support the integration the Cyprus super site into the ESFI road map and EU Research Networks
Support knowledge transfer for tailored CAL/VAL efforts of satellite missions.

**DEC-MTCW**
Space policy and Strategy: ensure the alignment of strategic goals of the CoE to those of the national/European priorities and strategies
Strategic Positioning: Coordinating the activities in order to promote Copernicus for the development of environmental services.
Identification of CoE’s strategic goals to bilateral agreements/MoUs with other countries

**ERATOSTHENES**
Centre of Excellence
Supporters of Phase 1 EXCELSIOR project

Public Sector
18 Governmental Departments

Local
5 Societies
3 Municipalities

Industry
2 companies

International
2 Networks
4 Organisations

EXCELSIOR

Cyprus University of Technology
DLR
IAASARS
TROPOS
DEC

EARSEL FOREST FIRES SIG WORKSHOP, CHANIA 25/9/2017
‘...Together with the strategic location, the national infrastructure and expertise, we can develop innovative space technology services and attract investments. The Earth observation sector in Cyprus is one of our priorities.....’

Minister of Transport, Communications and Works at the kick off meeting 8 Sept 2017
Proposed HUB: for data, products, services

- Part of the business plan.
- Ground receiving station in Cyprus.
- Infrastructure for hub (design, plan, implement).
- Provide R &D, services in the Eastern Mediterranean and Middle East (EMME) and Middle East and North Africa (MENA).
An External Advisory Committee have been set up to **guarantee and monitor the scientific quality of EXCELSIOR project**. The Committee is composed of leading scientists in the field of Space-Based and Earth Observation technologies. Bearing in mind the scope of the **EXCELSIOR** project, every effort has been made to have in this EAC representatives from the areas of academia, business and science.

<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
<th>Organisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr. Vincent Ambrosia (M)</td>
<td>Associate Program Manager NASA Applied Sciences Program</td>
<td>California State University</td>
</tr>
<tr>
<td>Dr. Marcello Maranesi (M)</td>
<td>International business experience in Geo-Spatial Information and Earth Observation</td>
<td>independent consultant</td>
</tr>
<tr>
<td>Prof. Lena Halounová (F)</td>
<td>Head of the Remote Sensing Laboratory/ IPSRS Secretary General</td>
<td>Czech Technical University</td>
</tr>
<tr>
<td>Dr. Peter Zeil (M)</td>
<td>Senior expert in the field of EO services and applications</td>
<td>Spatial Services Gmbh</td>
</tr>
<tr>
<td>Dr. Simonetta Cheli (F)</td>
<td>Head of Coordination Office</td>
<td>ESA Headquarters</td>
</tr>
</tbody>
</table>
VISION

• The new Centre to be the top-leading one in the Eastern-Med region in the earth observation
• Strong collaboration with partners/organizations/agencies in the Eastern Mediterranean and Middle East (EMME) and Middle East and North Africa (MENA).
• To host top scientists in earth observation.
• To be a sustainable centre through European and national funds
• To provide product and services / Hub
• ‘Cyprus’ to be on the ‘European Map of Earth Observation’
• Establishment of respective research infrastructure in Cyprus could further complete the existing network of international ground stations
...develop a business plan for promoting further the existing Group to a ‘EXcellence Research Centre for Earth Surveillance and Space-Based Monitoring Of the EnviRONment’. The business plan will be submitted for evaluation to the EU Horizon 2020 framework for Research and Innovation during Phase 2 of the Teaming Programme, seeking funding of 15 million euros for a period of 5-7 years, with the possibility of an additional equal amount of national co-funding for a period of 15 years plus 4 millions from CUT= 35 MILLION EUROS
Join us at this phase (through memorandum of understanding, Letters of commitment)

• Think for collaboration in earth observation in natural and built environment hazards, water resources, agriculture, coastal, cultural heritage, land applications, atmosphere, climate changes etc.

• Think for future collaboration in the EASTERN MED REGION such as ENERGY (solar radiation, oil & gas etc)! This is one of the future activities of the upgraded centre.
ATMOSPHERE:
Why EAST MED? Why Cyprus
EXCELSIOR
ERATOSTHENES: Excellence Research Centre for Earth Surveillance and Space-Based Monitoring of the Environment

Instrumentation

LM EARLINET
δ532nm
β532nm
β1064nm
α532nm

CUT-TEPAK #611
AERONET 8 channels
from 340 to 1640 nm wavelength

LACROS, Limassol, Cyprus, CyCARE 2016-2018

CROS: Leipzig Aerosol Cloud Remote Observation System
WATER RESOURCES MANAGEMENT
Agriculture: Irrigation water management
(image based techniques for evapotranspiration + field spectroscopy): GREAT OPPORTUNITIES IN THE EAST MED!
"Remote Sensing Archaeology", Citation based research from 1999-2015: STILL A LOT TO BE DONE!
RSCy2018
SPIE
PAFOS
CYPRUS (26-29 March 2018)
Thank you for your attention

For more information you can visit: www.excelsior2020.eu