



COST Action ES1309 OPTIMISE

Final Conference and Management Committee meeting,
Sofia, Bulgaria,

21st to 23rd February 2018 &

Organisers: Karolina Sakowska, Giulia Tagliabue,
Rumiana Vatseva *et al*

Hosted by

National Institute of Geophysics, Geodesy and Geography at
the Bulgarian Academy of Sciences, Sofia.



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OPTIMISE

Innovative Optical Tools for Proximal Sensing of Ecophysiological Processes

innOvative oPtical Tools for proxIMal sensing of ecophySiological procEesses (OPTIMISE)

- Proposers: ¹Alasdair Mac Arthur, ²L. Vescovo, ³E. Tomelleri, ⁴Micol Rossini, ⁵A. Hueni, ⁶M. Neal, ⁷J. Moreno, ⁸G. Wohlfahrt, & ⁹Albert Porcar-Castell.
- Chair Alasdair Mac Arthur, Vice Chair MaPi Cendrero
- WG1 Leader Christiaan van der Tol, coordinator MaPi Cendrero
- WG2 Leader Enrico Tomelleri, coordinator Helge Aasen
- WG3 Leader Andy Hueni, coordinator Shari Van Wittenberghe
- Training Leader Radek Juszczak • Dissemination Leader Albert Porcar
- OPTIMISE BUS Lead Helge Aasen



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University of
Zurich



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Innovative Optical Tools for Proximal Sensing of Ecophysiological Processes

Aim: “ ..to better understand reflectance and fluorescence measurements for ground validation of Earth system models and global satellite observations, using innovative spectrometers and UAV platforms, and develop automated wireless communication systems with on-line spectral information storage, quality assurance and data product sharing portals.”

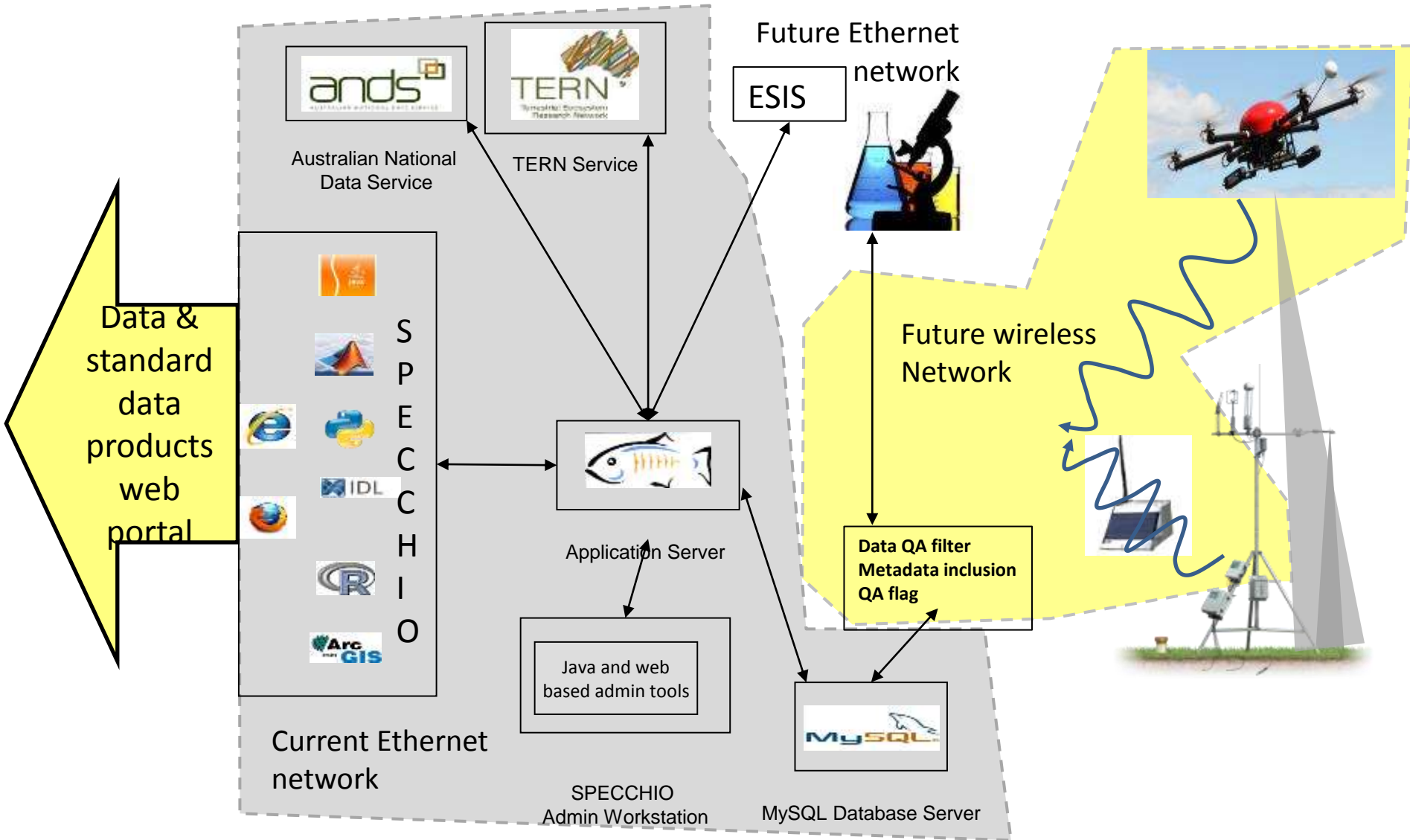
Objectives

- i. support and enlarge the global spectral sampling network and enhance our understanding of reflectance and fluorescence
- ii. harmonize instruments and measurement protocols adopted across different ecosystems
- iii. promote the use of a common 'smart' on-line spectral information system to share and standardized proximal sensing data and products
- iv. develop a consolidated ecosystem specific metadata and spectral data QA framework
- v. bridge the remote sensing scaling gap by integrating UAV-based proximal sensing and modelling ecosystem functioning at differing spatial and temporal scale



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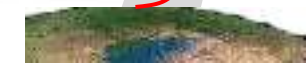
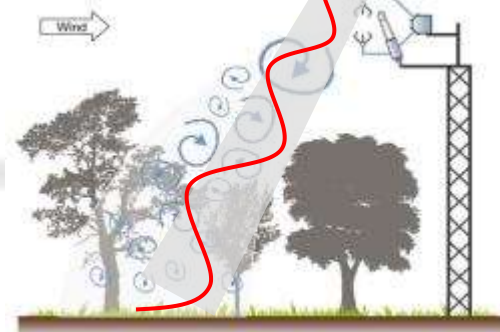
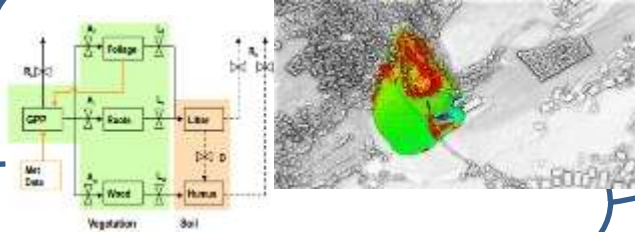
OPTIMISE:- WG1 Spectral information system



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OPTIMISE:- WG2 UAVs for upscaling proximal sensing ecosystem observations

Models



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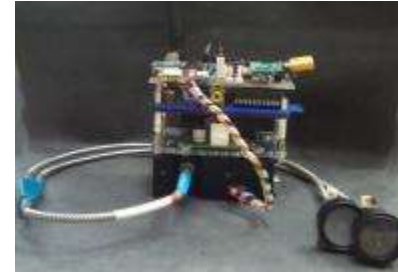
OPTIMISE:- WG3 Reflectance and Fluorescence



New UAV platforms for reflectance and fluorescence measurement & in spatial domain



Current reflect. & fluores. sensor dev. by U. of Milano Bicocca

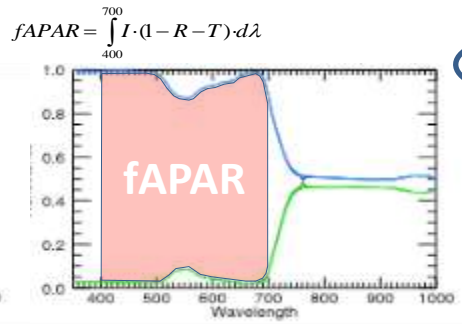
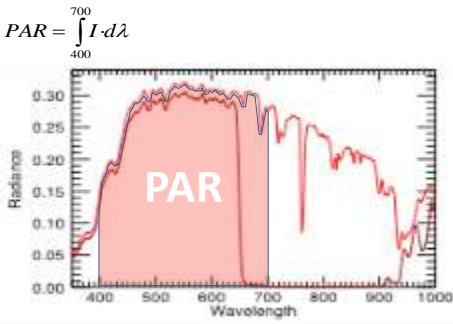


New UAV wireless sensor systems for reflect. & fluores. measurements



AIRFLEX Airborne FLEX Simulator

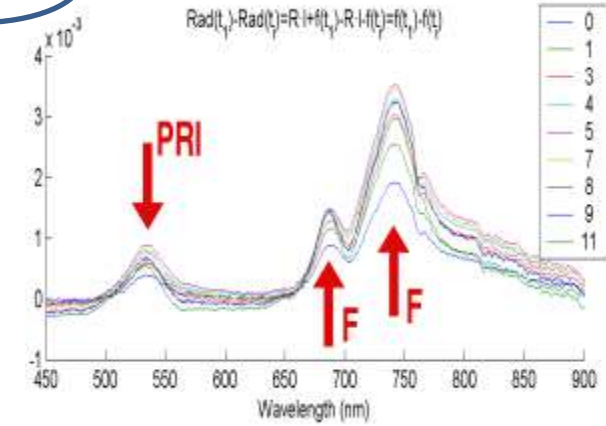
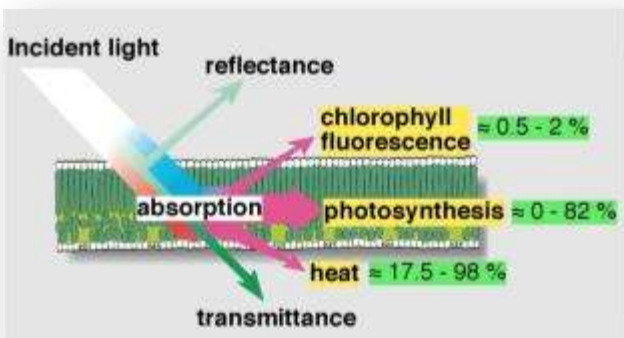
Coordinated field campaigns and Summer Schools



$APAR = fAPAR \times PAR$

Fluorescence Yield

$PRI = \frac{R_{531} - R_{570}}{R_{531} + R_{570}}$



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COST
AN COOPERATION
SCIENCE AND TECHNOLOGY

Workshop on Remote Sensing of Vegetation Reflectance and Fluorescence at the Bulgarian Academy of Sciences 21st to 23rd February, 2018



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WG1: MoU deliverables
Definition of a mandatory metadata set, aligned with current international efforts in the spectroscopy community
Develop an on-line instance of a spectral information database to serve as demonstration and testing platform for data sharing and information building
Develop a wireless automated dataflow from in-situ and UAV sensor for the database system
Definition and implementation of data pre-processing and metadata augmentation algorithms and routines including quality checks and flagging and data assimilation
Definition and implementation of system interfaces and algorithms for data retrieval allowing the building of products using sources such as biogeochemical modelling, flux data specialisation and space-sensed data
WG2: MoU deliverables
Review and report on the challenges for optical sensing in up-scaling biophysical properties of vegetation and test different UAV platform/measurement instruments setups
Development of a footprint tool for optimal placement of fixed spectrometers and for combination of EC measurements with UAV-based spectral data
Liaise with industry representatives to improve accuracy of GPS
Definition of new methods for scaling up functional relationships between optical properties and ecosystem processes from in-situ to landscape scale by means of UAVs, including identification of adequate radiative transfer models to be coupled with biogeochemical models for linking biogeophysical properties of vegetation with its optical properties (UAV spatial sampling and observation scaling needed for different ecosystems)

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WG3: MoU deliverables

Review and report on the methods and instruments used to estimate the solar-induced fluorescence from passive remote measurements

Definition of the technical requirements and acquisition protocols for reflectance and fluorescence measurements from UAV and ground-based instruments

Database of reflectance, fluorescence and productivity data for later use in models and applications

Integration of ground and UAV measurements with biochemical model outputs to better understand the links between photosynthesis, plant stress, growth and physiology with the temporal dynamics of reflectance and fluorescence



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08:00-09:00		Wednesday 21 st February Registration		
09:00-09:20		Welcome Rumiana Vatseva (BAC, Bulgaria)		
09:20-09:40		Session 1: Scientific Networking	Alasdair Mac Arthur (Univ. of Edinburgh, UK): “An introduction to COST Action ES1309 OPTIMISE”	
09:40-10:10			Timo Vesala (Univ. of Helsinki, Finland): “ICOS – From Science Projects to Integrated Infrastructure” (keynote)	
10:10-10:40			Nicholas Coops (Univ. of British Columbia, Canada): “Use of Innovative Remote Sensing Platforms and Networks for Vegetation Monitoring” (keynote)	
10:40-11:10			Coffee break	
11:10-11:35			Edoardo Cremonese (ARPA, Valle d'Aosta, Italy): “Linking near-surface remote sensing of plant phenology to ecosystem functioning: current state and perspectives from PhenoCam networks”	
11:35-12:00			Natascha Kljun (Swansea University, UK): “The Flux Footprint Prediction - Online Tool”	
12:00-13:00			Lunch	
13:00-13:30			Session 2: Spectral data: from collection to databases	Laurie Chisholm (Univ. of Wollongong, Australia): “Instruments, spectral data management and protocols” (keynote)
13:30-13:45		M. Pilar Cendrero-Mateo (Univ. of Valencia, Spain), Javier Pacheco-Labrador (MPI Jena, Germany), Helge Aasen (ETH Zürich, Switzerland): “Introduction to OPTIMISE review papers: Sun-Induced Chlorophyll Fluorescence - from instrument characterization and measurement protocols to retrieval methods.”		
13:45-14:05		Javier Pacheco-Labrador (MPI Jena, Germany): “Instrumental considerations for the measurement of sun induced fluorescence”		
14:05-14:25		Laura Mihai (INFLPR, Romania): “Protocols for field spectrometers spectral and radiometric calibrations”		
14:25-14:45		Helge Aasen (ETH Zürich, Switzerland): “Measurement setups and protocols for solar-induced chlorophyll fluorescence and reflectance measurements”		
14:45-15:05		Shari Van Wittenberghe (Univ. of Valencia, Spain): “Ecosystem spectral measurements: best practice metadata/ancillary dataset”		
15:05-15:35		Coffee break		
15:35-15:55		M. Pilar Cendrero-Mateo (Univ. of Valencia, Spain): “Ground measurements of Solar-induced chlorophyll fluorescence: retrievals methods and practical cases”		
15:55-16:15		Paul Näthe (FZ Jülich, Germany and JB Hyperspectral Devices, Germany): “Exploiting top of Canopy Sun Induced Chlorophyll Fluorescence by the FloX. From Instrument performance to data processing”		
16:15-16:35		Simon Trim (Univ. of Zürich, Switzerland): “FloX integrated data flow: from tower to database”		
16:35-17:00		Luis Alonso (Univ. of Valencia, Spain): “Passive SIF measurements at leaf level”		
17:00-17:30		Stefan Metzger (NEON, USA): “NEON: from scientific strategy to long-term operation” (remote talk)		
17:30-18:30		Poster session		
18:30-19:30		Welcome cocktail		

08:30-09:00	Thursday 22 nd February Registration		
09:00-09:30	Session 3: Unmanned Aerial Vehicles (UAVs) for vegetation monitoring	Pablo Zarco-Tejada (European Commission, JRC, Italy): “Plant physiological traits from high resolution hyperspectral and thermal imagery: models and indices for early stress detection” (keynote)	
09:30-09:45		Enrico Tomelleri (Free Univ. of Bozen, Italy): “Inversion of PROSAIL model from UAV-borne data”	
09:45-10:00		Alasdair Mac Arthur (Univ. of Edinburgh, UK): “DFOV multi-spectrometer system for reflectance and fluorescence measurements from mobile and fixed platforms”	
10:00-10:15		Helge Aasen (ETH Zürich, Switzerland): “Non-imaging (ground) and imaging (UAV) measurements differ due to different specific field of views”	
10:15-10:30		Julia Kelly (Swansea University, UK): “Testing the performance of a UAV thermal camera”	
10:30-11:00		Coffee break + poster session	
11:00-11:15		Denis Nikolaev (EMLID, Russia): “RTK GNSS for UAV mapping”	
11:15-11:30		Marco Dubbini (Univ. Bologna, Italy): “Comparison of proximity VIS-NIR data acquired with MAIA sensor on 8 WorldView2 bands and 9 Sentinel2 bands”	
11:30-11:45		Michał Chiliński (Univ. of Warsaw, Poland): “Correlation between vegetation indices and ant populations – spectral measurements from UAV”	
11:45-12:00		Miriam Machwitz (Luxembourg Institute of Science and Technology, Luxembourg): "UAV based estimation for total nitrogen uptake"	
12:00-12:15		Shawn C. Kefauver (Univ. of Barcelona, Spain): "UAV Phenotyping and Proximal Sensing for Maize Assessments in Breeding Programs"	
12:15-12:30		Kadmiel Maseyk (The Open University, UK): “Forest response to elevated CO ₂ from UAV-based measurements of Solar Induced Fluorescence”	
12:30-13:30		Lunch	
13:30-14:00		Session 4: Reflectance and fluorescence to better understand plant functioning and ecophysiological processes	Uwe Rascher (FZ Jülich, Germany): “Title to be confirmed” (keynote)
14:00-14:30			Kaiyu Guan (Univ. of Illinois, USA): “Harnessing satellite big data for predicting food production” (keynote)
14:30-14:50	Lars Eklundh (Lund University, Sweden): “OPTIMISE data for understanding phenology and carbon cycling”		
14:50-15:20	Coffee break + poster session		
15:20-15:40	Giulia Tagliabue (Univ. of Milano-Bicocca, Italy): “Linking sun-induced fluorescence and photosynthesis in a forest ecosystem”		
15:40-16:00	Georg Wohlfahrt (Univ. of Innsbruck, Austria): “Gross primary productivity during a heat wave – putting sun-induced fluorescence to the test”		
16:00-16:20	Petya Campbell (Univ. of Maryland Baltimore County, USA): “Comparing the diurnal and seasonal dynamics in chlorophyll fluorescence and xanthophyll cycle, associated with photosynthetic function for two vastly different canopies”		
16:30-19:00		City tour + networking time	
20:00-22:00		Networking dinner	

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08:30-09:00	Friday 23 rd February Registration	
09:00-09:30	Session 5: Vegetation modeling	Christiaan van der Tol (Univ. of Twente, The Netherlands): "SCOPE for retrieving plant traits from reflectance and solar induced chlorophyll fluorescence" (keynote)
09:30-09:50		Jochem Verrelst (Univ. of Valencia, Spain): "Progress in ARTMO: from physical modeling towards machine learning interpretation"
09:50-10:10		Mirco Migliavacca (MPI Jena, Germany): "Inform terrestrial biosphere models with hyperspectral remote sensing and CO ₂ fluxes"
10:10-10:25		Nastassia Rajh Vilfan (Univ. of Twente, The Netherlands): "Retrieving photosynthesis from leaf chlorophyll fluorescence and green reflectance"
10:25-11:00		Coffee break + poster session
11:00-11:15		Marco Celesti (Univ. of Milano-Bicocca, Italy): "Analysis of short-term vegetation dynamics combining hyperspectral measurements and RTMs inversion"
11:15-11:30		Peiqi Yang (Univ. of Twente, The Netherlands): "Linking canopy scattering of sun-induced chlorophyll fluorescence with reflectance"
11:30-11:45		Sheng Wang (Technical Univ. of Denmark, Denmark): "Temporal interpolation of rapidly changing land surface variables estimated from an Unmanned Aerial System"
11:45-12:00	MC	Closing of the conference
12:00-13:30		Management Committee meeting
13:30-14:30		Lunch



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Friday	Agenda 23rd February OPTIMISE Final MC meeting 2018	
12:00-12:10	Introduction to MC meeting by Chair	
12:10- 12:20	Financial Report from Action Manager and Chair	
12:20-12:40	Monitoring and Evaluation Group Leader report	
12:40-13:00	WG Leaders' reports and proposals to achieve remaining objectives	
13:00-13:10	Training Leader and Dissemination Leader reports	
13:10-13:30	Development and submission of Final Report to COST Association and wrap-up	
13:30	Close of MC meeting	



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All must sign the attendance list daily or expenses cannot be paid

Need expense claims submitted through e-COST asap

Please provide information on all your successes, achievements and impacts (grants applied for/received incl. H2020; projects; publications; publicity, outreach etc) related to OPTIMISE for inclusion in the Final Report.

This information is used by COST to report to the European Commission



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