



Task Group Health

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Madrid and Tres Cantos, Spain
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TG Health – Group Members



Members:

Adriaan van der Veen (VSL),
Baki Karaböce (TUBITAK),
Beat Jeckelmann (METAS),
Helen Parkes (LGC),
Ian Severn (NPL),
Mariapaola Sassi (INRIM),
Sophie Vaslin-Reimann (LNE),
Tobias Schaeffter (PTB),
Ulrike Ankerhold (PTB)

Quarterly Meetings:

- One face2face meeting
- 3 Web-based meetings

TG Health – Objectives



The aim of the Task Group is to form a coherent approach on metrology for health by

- complementing the work of EURAMET's TC
 - Liaising with the Joint Committee for Traceability in Laboratory Medicine (**JCTLM**) and other groups
 - Supporting the **development of standards, measurement methods and measurement structures**
 - Develop the **Strategic Research Agenda (SRA)** for EMPIR
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- **Propose research topics** for joint research projects and to elaborate road maps for future R&D
 - **Disseminate expertise and knowledge** on metrology for health through seminars, guides and conferences

TG Health - Activities 2016 / 17



1. Review of EMRMP/EMPIR projects
2. “Speed Dating Event” of new EMPIR Projects
3. Call-Scope 2018
 - a. EURAMET Strategic Research Agenda (SRA)
 - b. H2020 Alignment

IMERA+ funded Projects



IMERA+ – Topics of the 6 funded Health projects

- 2 in-vitro diagnostics (IVD) related
- 2 radiation therapy related
- 1 Regenerated Medicine
- 1 Breath Analysis

Theme 2: Health

Breath analysis as a diagnostic tool for early disease detection	Breath analysis	Dr Adrian van der Veen (VSL)
Metrology on a cellular scale for regenerative medicine	Regnmed	Dr Paul Tomlins (NPL)
Increasing cancer treatment efficiency using 3D brachytherapy	Brachytherapy	Dr Maria Pia Toni (ENEA)
External Beam Cancer Therapy	EBCT	Dr Ulrike Ankerhold (PTB)
Traceable measurements for biospecies and ion activity in clinical chemistry	TRACEBIOACTIVITY	Dr Bernd Güttler (PTB)
Traceability of Complex Biomolecules and Biomarkers in Diagnostics - Effecting Measurement Comparability in Clinical Medicine	CLINIBIOTRACE	Dr Helen Parkes (LGC)

EMRP – funded Projects



EMRP – Topics of the 11 funded Health projects

- 5 in-vitro diagnostics (IVD) related
- 2 radiation therapy related
- 1 therapeutic ultrasound
- 1 drug delivery
- 1 MRI safety
- 1 hearing safety

METROLOGY FOR HEALTH

PROJECT NUMBER ▲▼	SHORT NAME ▲▼	TITLE ▲▼	COORDINATOR ▲▼
HLT01	Ears	Metrology for a universal ear simulator and the perception of non-audible sound	Christian Koch (PTB)
HLT02	MetVes	Metrological characterisation of micro-vesicles from body fluids as non-invasive diagnostic biomarkers	Rienk Nieuwland (VSL)
HLT03	DUTy	Dosimetry for ultrasound therapy	Adam Shaw (NPL)
HLT04	BioSurf	Metrology for the characterisation of biomolecular interfaces for diagnostic devices	Alice Harling (NPL)
HLT05	Metallomics	Metrology for metalloproteins	Claudia Swart (PTB)
HLT06	MRI safety	Metrology for next-generation safety standards and equipment in MRI	Bernd Ittermann (PTB)
HLT07	MeDD	Metrology for drug delivery	Peter Lucas (VSL)
HLT08	INFECT-MET	Metrology for monitoring infectious diseases, antimicrobial resistance, and harmful micro-organisms	Carole Foy (LGC)
HLT09	MetrExtRT	Metrology for radiotherapy using complex radiation fields	Jean Marc Bordy (LNE-LNHB)
HLT10	BiOrigin	Metrology for biomolecular origin of disease	Andre Henrion (PTB)
HLT11	MetroMRT	Metrology for molecular radiotherapy	Vere Smyth (NPL)

EMPIR 2015 – funded Projects



EMPIR – Topics of 9 funded Health projects

- 2 IVD related
- 2 neurodegenerative related
- 2 radiation therapy related
- 1 Quantitative Imaging
- 1 Hearing related
- 1 Additively manufactured implants

HEALTH

PROJECT NUMBER ▲▼	SHORT NAME ▲▼	TITLE ▲▼	COORDINATOR ▲▼
15HLT01	MetVBadBugs	Quantitative measurement and imaging of drug-uptake by bacteria with antimicrobial resistance	Paulina Rakowska (NPL)
15HLT02	ReMiND	Role of metals and metal containing biomolecules in neurodegenerative diseases such as Alzheimer's disease	Claudia Swart (PTB)
15HLT03	Ears II	Metrology for modern hearing assessment and protecting public health from emerging noise sources	Christian Koch (PTB)
15HLT04	NeuroMet	Innovative measurements for improved diagnosis and management of neurodegenerative diseases	Milena Quaglia (LGC)
15HLT05	PerfusImaging	Metrology for multi-modality imaging of impaired tissue perfusion	Tobias Schäffter (PTB)
15HLT06	MRTDosimetry	Metrology for clinical implementation of dosimetry in molecular radiotherapy	Steven Judge (NPL)
15HLT07	AntiMicroResist	Novel materials and methods for the detection, traceable monitoring and evaluation of antimicrobial resistance	Jim Huggett (LGC)
15HLT08	MRgRT	Metrology for MR guided radiotherapy	Jacco de Pooter (VSL)
15HLT09	MetAMMI	Metrology for additively manufactured medical implants	Anne-Francoise Obaton (LNE)

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EMPIR 2015 – Organisation



Issues

- 1st phase less transparent than 2nd phase
- Cutoff at 9 Projects due to same score of 10/11th project
- Relation of certain projects to form clusters

EMPIR Project Clusters



“Speed Dating” of projects 23-May-2016

- Web-based meeting for potential project collaboration (1 hour)
- 6 min presentations
- 5 projects have registered and send material
- Fruitful discussion between projects on neurodegenerative disease
- collaboration on exchange of reference material initiated

Health ranked list			
1	15HLT01	JRP-h02	MetVBadBugs
1	15HLT02	JRP-h11	ReMIND
1	15HLT03	JRP-h22	Ears II
4	15HLT04	JRP-h13	NeuroMet
5	15HLT05	JRP-h09	PerfusImaging
5	15HLT06	JRP-h18	MRTDosimetry
7	15HLT07	JRP-h01	AntiMicroResist
7	15HLT08	JRP-h15	MetMRgRT
9	15HLT09	JRP-h04	MetrAMMI

Review of Programs



- Have the programs invested in the right topics?
- Have the programs enabled new topics?
- Have they created a measurable impact outside metrology?
- Have they created a critical mass?

EMPIR Call Scope 2018



EMPIR Health - Call 2018

- How to select Topics?
- How to create critical mass ?
 - Formation of project cluster
 - Themes rather general call?
 - Prioritization through links to H2020

Healthcare Grand Challenges

- Personalizing healthcare, ageing population and the related rise in **chronic diseases** including cancer, neurodegenerative disorders and cardiovascular disease.
- Costly technological advances in **screening, diagnostics and therapies**.
- More knowledgeable patient demands, and a shifting paradigm from diagnosis and **cure to predict and prevent**.

2.1 Health Grand Challenge

2.1.1 Key challenges

Healthcare is considered one of the major European Challenges and a strategic cornerstone in almost all EU R&D programmes. In the upcoming decade healthcare will remain a top priority politically as well as socio-economically, and its importance will even be intensified due to demographic change and spiraling costs that put even the richest nations under pressure.

Total expenditure on health in the European region is 9.0% of GDP (2011)(7.9% in 2000) ¹¹

"Healthcare costs are rising faster than levels of available funding" ¹²

Notably, the EU is required by its founding treaty to ensure that human health is protected as part of all its policies, and to work with the EU countries to improve public health, prevent human illness and eliminate sources of danger to physical and mental health (EU Health Strategy "Together for Health" ¹³).

"As cancer is one of the major causes of ill health in the European Union, associated with a considerable cost to society, it is essential to invest in Europe's future health by taking long-term and sustainable actions to tackle cancer." ¹⁴

A number of significant EU, World Health Organization (WHO) and other policy drivers ^{15, 16, 17, 18, 19, 20} and foresight studies ^{21, 22, 23} highlight future healthcare challenges, and requirements for supporting research and technology development. Identified healthcare challenges within Europe include:

- Personalizing healthcare, an ageing population and the related rise in chronic diseases including cancer, neurodegenerative disorders and cardiovascular disease.
- Costly technological advances in screening, diagnostics and therapies.
- More knowledgeable patient demand, and a shifting paradigm from diagnosis and cure to predict and prevent.



Horizon 2020 – Advice for Upcoming Call



VERTICAL themes

1. Personalised medicine
2. Rare diseases
3. Infectious diseases
4. Non-communicable diseases
5. Paediatrics
6. Public health and prevention including migration
7. Active and healthy ageing

HORIZONTAL themes

8. Big data
9. eHealth, mHealth, ICT
10. Integration of care
11. Environment and health, green solutions and sustainability including

CROSS-CUTTING issues

12. Social Sciences and Humanities, integration, inequalities, migration
13. Sex and gender differences in medicine
14. Commercialisation within "Health, Demographic Change and Well-being"
15. Encouraging stronger and successful involvement of EU-13

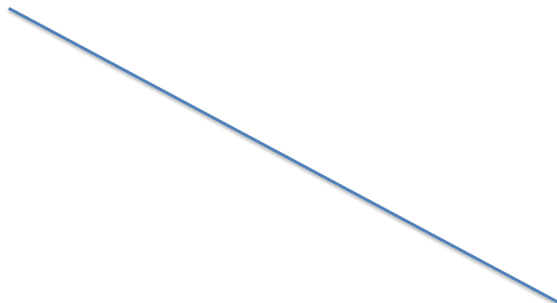


Advice for 2018–2020 of the Horizon 2020 Advisory Group
for Societal Challenge 1,
"Health, Demographic Change and Well-being"

Call Scope Empir-H2018



- Call scope 2 pages
 - General description and objectives 1st page
 - Scope definition 2nd page
- Two Dimensions: Application/Technology



	Personalized Medicine	Non-communicable Disease	Infectious Disease
Multiparametric med. measurements, characterisation and data analysis	X	X	X
Cell and molecular diagnostics and therapeutics	X	X	X
Personalized dose management for advanced radiotherapy	X	X	

Call Scope Empir-H2018



Vertical (application-oriented):

- Personalised / stratified medicine separates patients into different groups — with medical decisions, practices, interventions and/or products being tailored to the individual patient based on their predicted response or risk of disease.
- Non-communicable diseases (oncology, neurology, cardiology) are medical conditions or diseases which are non-infectious or non-transmissible. They refer to chronic diseases, which last for long periods of time and progress slowly.
- Infectious diseases are caused by foreign organisms such as bacteria, viruses, fungi or parasites. Priority areas include vaccines; novel diagnostics, anti-infective diagnostics and therapeutics; sepsis control and host genetic factors effect on disease severity.

Horizontal (technology-oriented):

- Multi-parametric medical measurements, characterisation and data analysis. Metrological priorities are the i) characterisation of uncertainties by reference techniques or calibration devices to support multi-parametric measurements. ii) New quantitative imaging techniques that avoid inter-observer variability. iii) Interoperability and standardisation of different data to establish consistent large-scale data that can be exploited with iv) new statistical approaches, dimensionality reduction and machine learning techniques.
- Reference measurement systems for cell and molecular diagnostics and therapeutics. Priority focus on addressing: i) Improved reference measurements for clinically important NA and protein biomarkers; ii) Challenges of improved pre-analytics, reliability, traceability and standardisation of cell and biomolecular measurement techniques to support technological advances in rapid and high throughput analytical platforms (including point of care); iii) Standardisation of characterisation measurements to underpin comparability of new cell and gene therapeutics and QC of biobanks.
- Personalised dose management for advanced radiotherapy. This topic addresses metrology needs for modern forms of radiotherapy, e.g. sophisticated photon radiotherapy, image guided radiotherapy (IGRT), hadron radiation therapy or molecular radiotherapy. In this context, the focus lies on metrology needs to realise i) reliable and accurate personalised dose management, including the ii) relationship between dose and biological damage, through iii) advanced planning and delivery systems during the whole treatment process

Call Scope - Feedback



Response from INRIM, TC-AUV, TC-F, (TC-T)

- Positive: Alignment with H2020
- Negative: Wish for inclusion of specific Topics:
 - food-related disease, Diabetes
 - acoustic noise
 - In-silico medicine
 - modern therapy approaches, like focused Ultrasound

Call Scope - Feedback



Discussion within TG-Health (2-May)

- Many detailed technical topics are possible within the scope, but should not be mentioned explicitly (e.g. Diabetes as part of non – communicable disease)
- Certain food aspects (ie specific pathogenes) are covered within the scope but should not be mentioned explicitly
- Acoustic noise more seen as environment than health challenge
- Scope has been modified to allow FUS or hyperthermia projects
- Scope has been modified to allow simulations (in-silico medicine)

