



Welcome to TraMeXI workshop on X-ray imaging dosimetry

Chairs: Paula Toroi STUK/HUS and Mika Kortenesniemi HUS



Bridge Hospital
HUS - Helsinki University Hospital
Helsinki, Finland
20 – 22 November 2024

HUS:

- 28 000 employees
- 3000 scientific articles per year

HUS Diagnostic Center:

- 2.2 M population base
- 2 M examinations per year
- 60 sites

Medical Physics:

- **20 Radiology (3 AI-physicists, 4 residents)**
 - 7 Nuclear Medicine (1 Resident)
 - 7 Clinical Neurophysiology (1 Resident)
 - 4 IT
 - 4 Image Processing / Researchers
 - 1 Secretary
 - 1 MD
- + 16 RT physicists

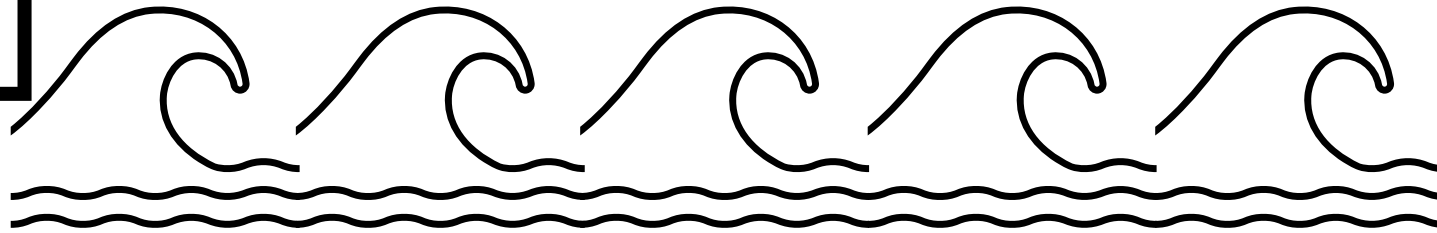
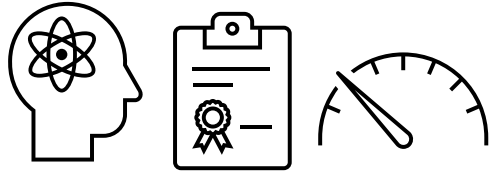
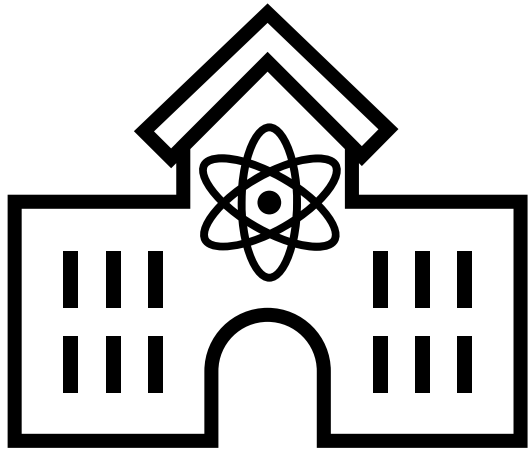
Equipments:

- 100 DR
 - 100 US
 - 35 CT + 1 mobile CT
 - 24 MRI
 - 12 Mammo
 - 9 Angio
 - 6 Fluoro
 - 6 CBCT
 - 9 Cardio-angio
 - 5 DEXA
 - 71 Dental
 - 49 Surgical C-arms
 - 7 Surgical angio
- + Cyclotron, proton cannon, ...
+ PET-MRI, MRI-Linac, ...
+ GPU/servers, 3D-printing, ...

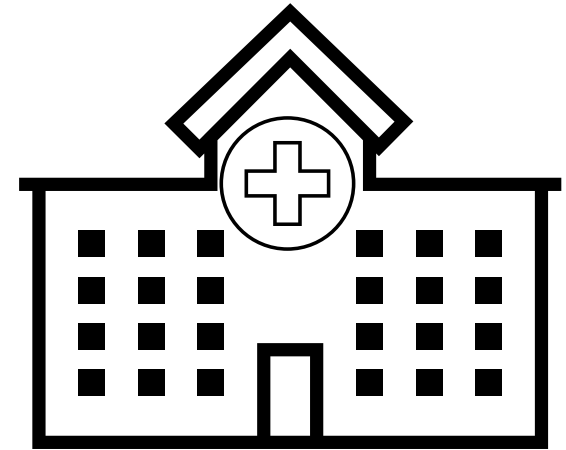


Challenges related to traceability

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<http://tramexi.com>

EURAMET NRM01 TraMeXI (6/2023 – 5/2026)
= Traceability in medical X-ray imaging dosimetry



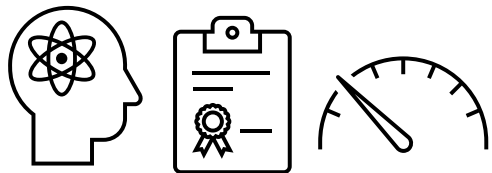
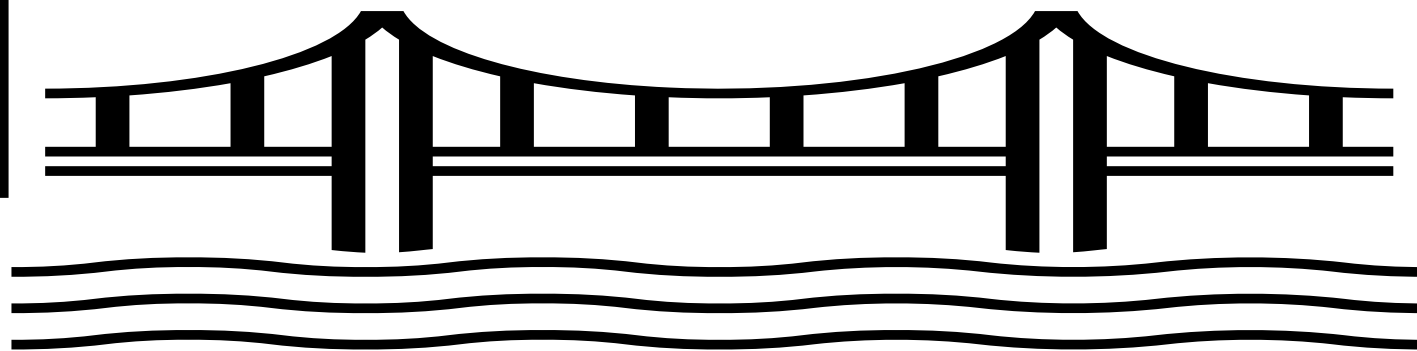
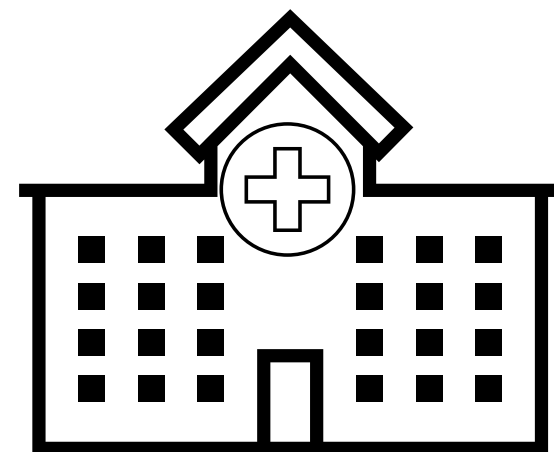
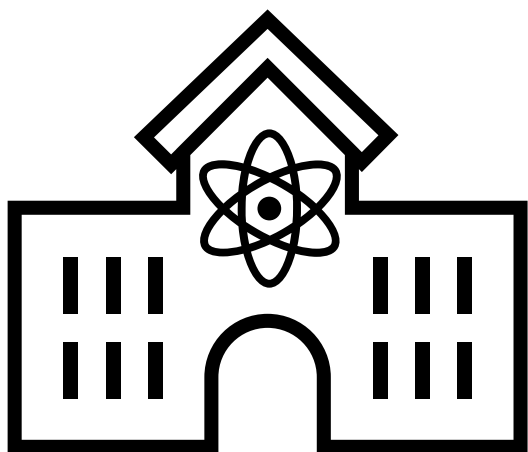
The projects (22NRM01 TraMeXI) has received funding from the European Partnership on Metrology, co-financed from the European Union’s Horizon Europe Research and Innovation Programme and by the Participating States. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or EURAMET. Neither the European Union nor the granting authority can be held responsible for them.



Workshop together at the bridge hospital

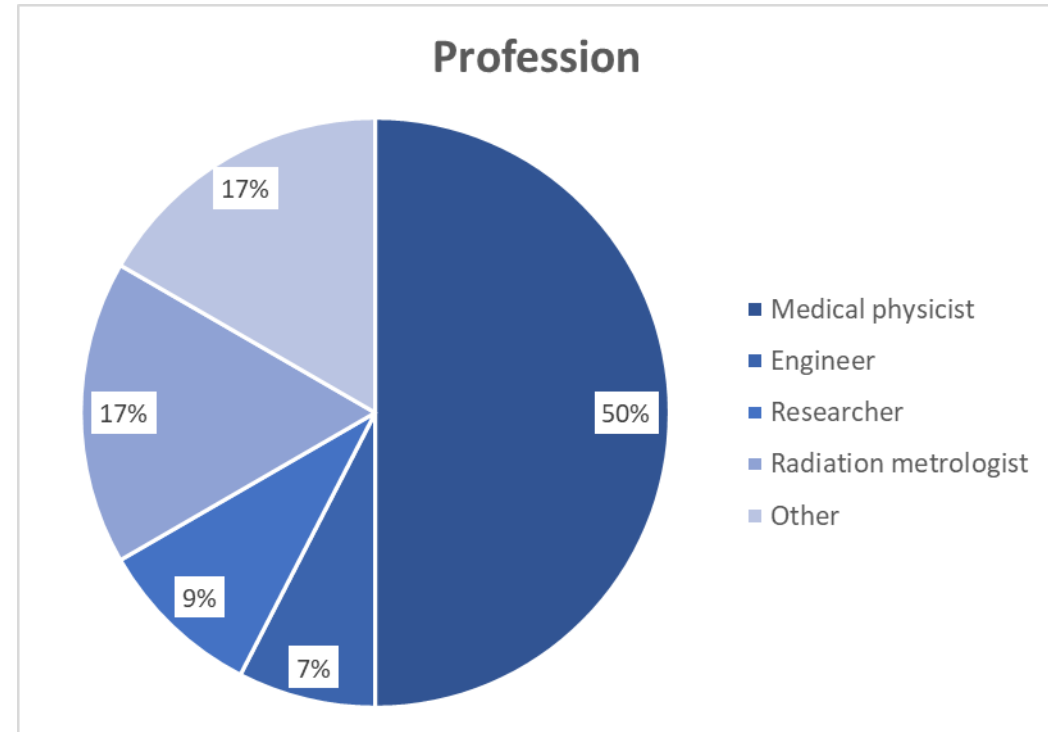
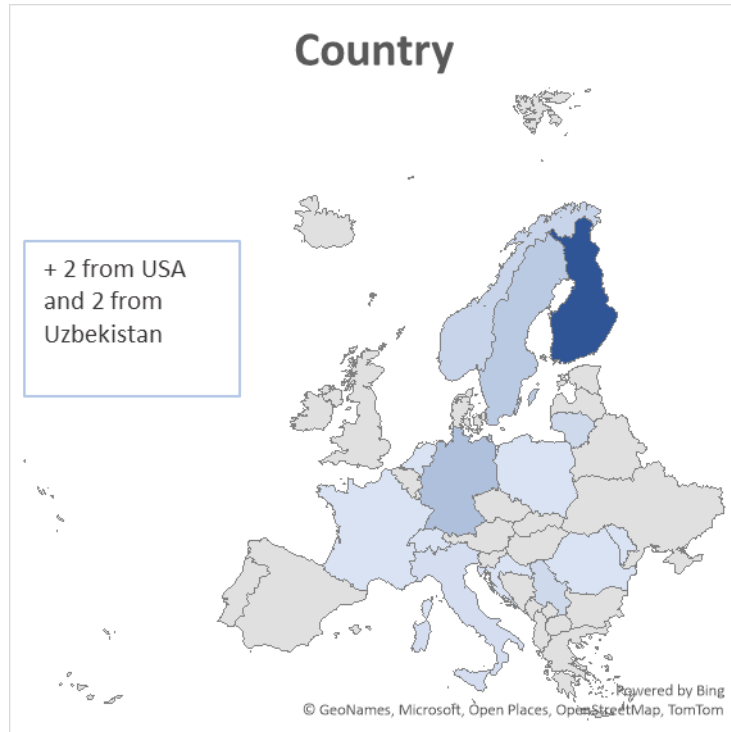
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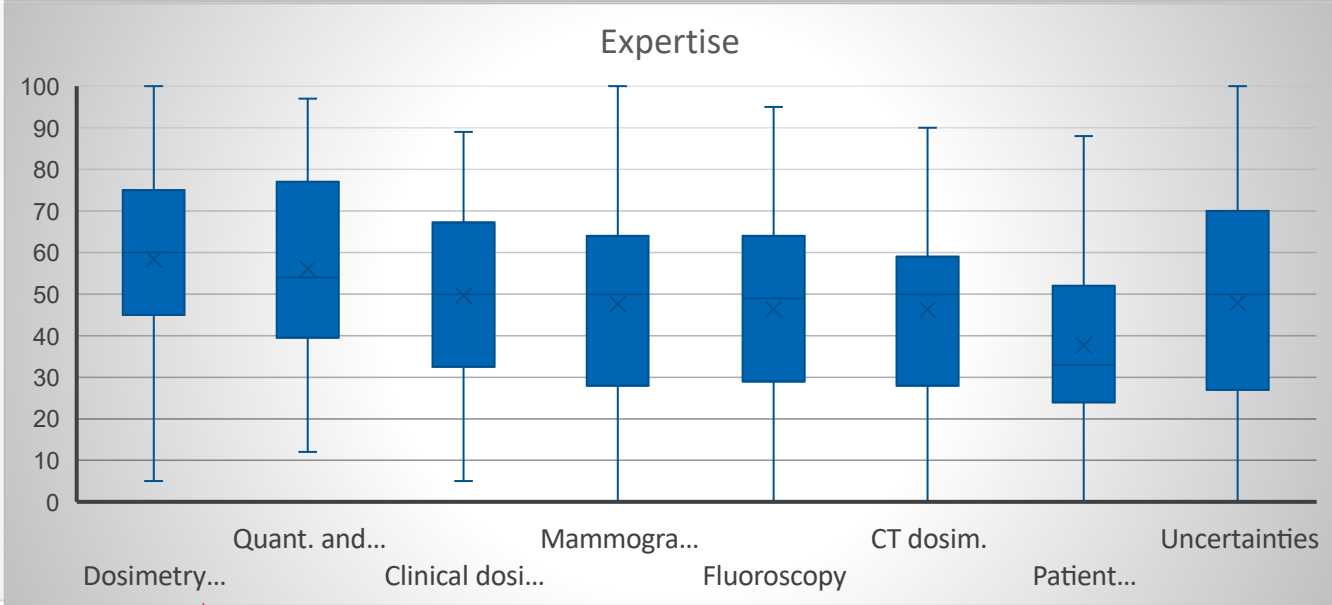
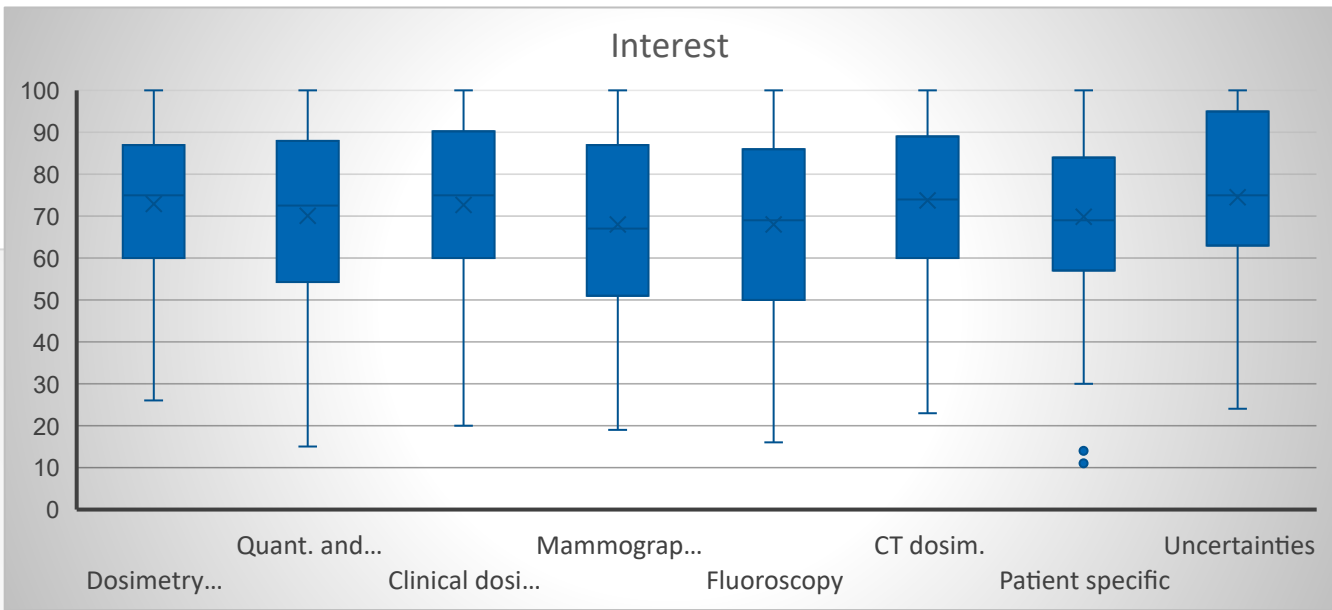
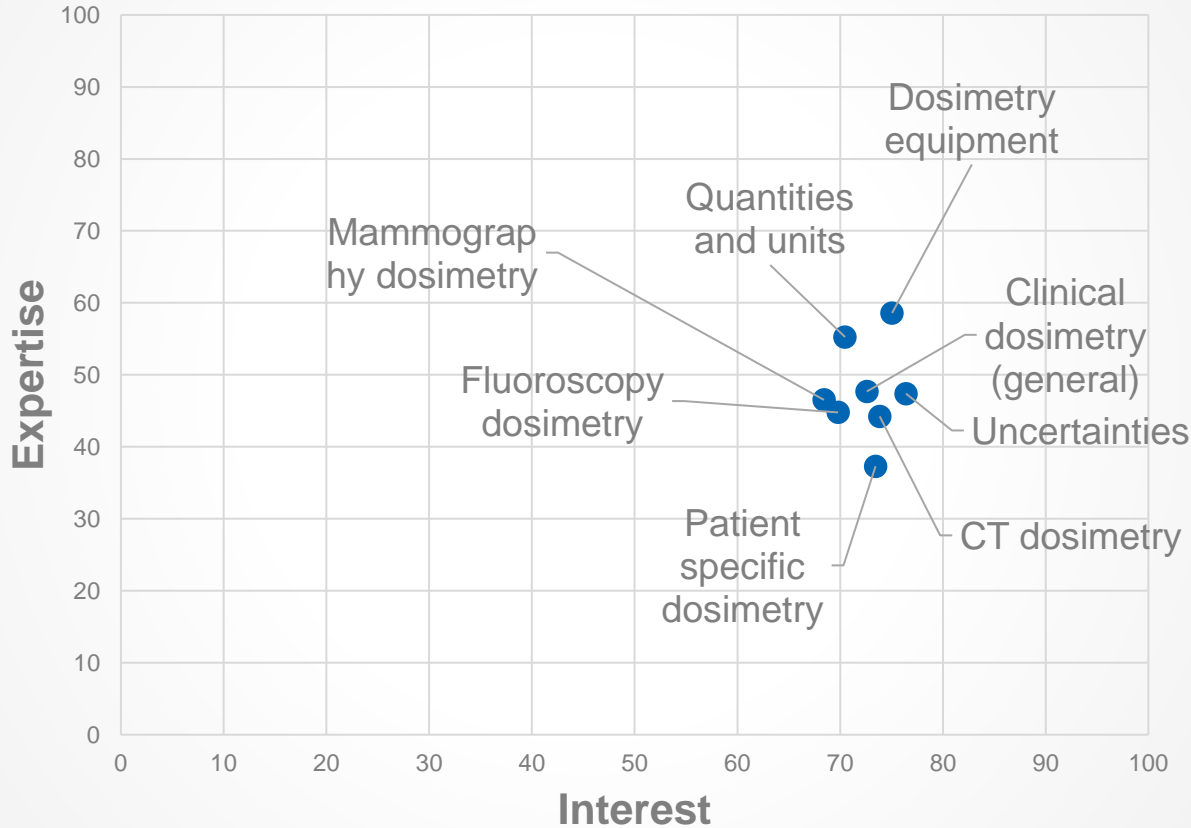
Participation

- 70 participants from 16 different countries

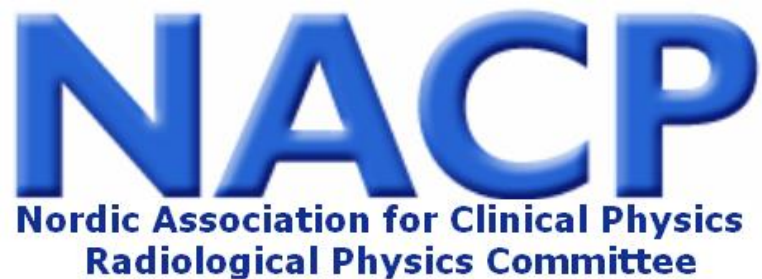


Interest and expertise

Average interest/expertise



The workshop is organized in collaboration with:



The workshop is sponsored by:



The workshop is endorsement by:



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EUROPEAN PARTNERSHIP



Co-funded by the European Union

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METROLOGY PARTNERSHIP





Now it starts....enjoy the workshop



Content

Wednesday: 20 November 2024

X-ray dosimetry fundamentals and codes of practice

- Dosimetry equipment principles and operation
- Introduction on imaging modality specific measurement procedures
- Developments in mammography dosimetry
- Dosimetry companies presenting their products
- *Social event 19:00 –*

Thursday: 21 November 2024

Practical approach and uncertainties

- Patient specific dosimetry
- Uncertainties
- Practical exercises

Friday: 22 November 2024

Plans for future: targets and aims

- Current status of dosimetry
- Deep learning-powered multimodality medical imaging
- New aim for the future
- Group photo and Raptor visit

Wednesday: 20 November 12:10 - 13:15

12:10 - 13:15 Dosimetry equipment principles and operation

12:10 – 12:30 Ionization chambers (ICs) and X-ray multimeters (XMMs) (20 min)

Stefan Pojtinger, PTB, Germany

12:30 – 12:50 Quantities and parameters beyond air kerma (20 min)

Miloš Živanović, VINS, Serbia, and Markus Borowski, SKBS, Germany

12:50 – 13:05 Calibration and metrology (15 min)

Leon de Prez, VSL, the Netherlands

Discussion (10 min)

Coffee break 13:15-13:45

Wednesday: 20 November 13:45 – 15:00

13:45 – 15:00 Introduction on imaging modality specific measurement procedures

13:45 – 14:10 Overall introduction (25 min)

Luigi Rinaldi, OPBG, Italy

14:10 – 14:30 Interventional (including C-arms, CBCT) (20 min)

Jouni Uusi-Simola, HUS, Finland

14:30 – 14:50 CT (including wide beams) (20 min)

Mika Kortenesniemi, HUS, Finland

Discussion (10 min)

Coffee break 15:00 – 15:20

Wednesday: 20 November 15:20 – 17:00

15:20 – 17:00 Developments in mammography dosimetry

15:20 – 16:20 New CoP: EFOMP-AAPM breast dosimetry protocol (60 min)

Ioannis Sechopoulos, Radboud University Medical Center, the Netherlands

16:20 – 16:40 Novel radiation qualities and spectra measurements (20 min)

Elisabeth Salomon, PTB, Germany

16:40 – 16:50 XMM results in mammography (10 min)

Andrea Kojić, VINS, Serbia

Discussion (10 min)

Wednesday: 20 November 17:00 – 23:00

17:00 – 18:00 Dosimetry companies presenting their products

17:00 – 17:12 IBA Dosimetry GmbH (12 min)

Daniel Boedeker, IBA Dosimetry GmbH, Germany

17:12 – 17:24 PTW Freiburg GmbH (12 min)

Mohsen Shahrabi, PTW Freiburg GmbH, Germany

17:24 – 17:36 Unfors RaySafe AB (12 min)

Patrik Andersson and Mattias Gustavsson, Unfors RaySafe AB, Sweden

17:36 – 17:48 RTI Group AB(12 min)

Sören Stuesson, RTI Group AB, Sweden

Discussion (12 min)

Short break and transit to the restaurant 18:00 – 19:00

Social event at Fat Lizard 19:00 – 23:00

Thursday: 21 November 09:00 – 10:30

09:00 – 10:30 Patient specific dosimetry

09:00 – 09:20 What is patient dose? (20 min)

Bente Konst, Vestfold, Norway and Linköping, Sweden

09:20 – 09:50 MC simulations: skin dose in interventional radiology (30 min)

Jonas Andersson, University of Umeå, Sweden

09:50 – 10:20 Use of AI in dosimetry (30 min)

Satu Inkinen, HUS, Finland

Discussion (10 min)

Coffee break 10:30 – 11:00

Thursday: 21 November 11:00 – 12:30

11:00 – 12:30 Uncertainties

11:00 – 11:20 Theory and practice for air kerma and HVL (20 min)

Aino Tietäväinen, STUK, Finland

11:20 – 11:40 Practical example for clinical measurements (20 min)

Niko Kiiskinen, HUS, Finland

11:40 – 12:00 Practical example for skin dose (20 min)

Jonas Andersson, University of Umeå, Sweden

12:00 – 12:20 How to use calibration certificates in clinical practice (20 min)

Paula Toroi, STUK/HUS, Finland

Discussion (10 min)

Lunch break and walk outside 12:30 – 14:30

Thursday: 21 November 14:30 – 18:00

14:30 – 18:00 Practical exercises

14:30 – 14:40 Introduction

Mod.: Paula Toroi, STUK/HUS, Finland; Guide: Mika Kortenesniemi, HUS

14:40 – 15:20 Conventional (40 min)

Juha Peltonen, Jenna Tarvonen, 5 backstage participants

15:25 – 16:05 Mammography (40 min)

Anne-Mari Vitikainen, Jenna Tarvonen, 5 backstage participants

16:10 – 16:50 Interventional (40 min)

Touko Kaasalainen, Jenna Tarvonen, 5 backstage participants

Break 16:50 – 17:00

17:00 – 18:00 Practical: calculation of uncertainties (60 min)

Paula Toroi, STUK/HUS, Aino Tietäväinen, STUK, and Niko Kiiskinen, HUS

Friday: 22 November 09:00 – 11:00

09:00 – 09:50 Current status of dosimetry

09:00 – 09:20 Short introduction to current situation with clinical measurements (20 min)

Markus Borowski, SKBS, Germany

09:20 – 09:40 Practical example for clinical measurements (20 min)

Miloš Živanović and Nikola Kržanović, VINS, Serbia

Discussion (10 min)

Short break 09:50 – 10:00

10:00 – 11:00 Deep learning-powered multimodality medical imaging

Prof. Habib Zaidi, HUG Hôpitaux Universitaires Genève, Switzerland

Coffee break 11:00 – 11:15

Friday: 22 November 11:15 – 12:15

11:15 – 12:15 New aim for the future

11:15 – 11:35 Update of Code of Practice (20 min)

Miloš Živanović, VINS, Serbia, and Luigi Rinaldi, OPBG, Italy

11:35 – 12:00 Discussion (25 min)

Mod.: Miloš Živanović, VINS, Serbia, and Markus Borowski, SKBS, Germany

12:00 – 12:15 Conclusions and farewell (15 min)

Mika Kortensniemi HUS and Paula Toroi, HUS/STUK, Finland

12:15 – 13:00 Group photo and Raptor visit

The workshop ends