



6th Meeting Knowledge Transfer (KT) Forum dedicated to Medical Applications (MA)
27 September 2022

Summary Record

Link to the Indico webpage (agenda and presentations)

<https://indico.cern.ch/event/1089904/>

The 6th Meeting of the KT Forum dedicated to MA was held at CERN, Geneva, on Tuesday 27 September 2022. It was a hybrid meeting with some participants and 2 speakers joining via zoom.

CERN Member States (MS): Austria (AT), Belgium (BE), Bulgaria (BG), Czech Republic (CZ), Denmark (DK), Finland (FI), France (FR), Germany (DE), Greece (GR), Hungary (HU), Israel (IL), Italy (IT), Netherlands (NL), Norway (NO), Poland (PL), Portugal (PT), Romania (RO), Serbia (RS), Slovak Republic (SK), Spain (ES), Sweden (SE), Switzerland (CH), United Kingdom (UK).

CERN Associate Member States (AMS): Croatia (HR), India (IN), Lithuania (LT), Pakistan (PK), Turkey (TR), Ukraine (UA).

CERN Associate Member States in the pre-stage to Membership: Cyprus (CY), Slovenia (SI).

List of participants:

Chairpersons: Mike Lamont, CERN Director for Accelerators and Technology; Giovanni Anelli, CERN Knowledge Transfer Group Leader.

Members of KT Forum: Manfred Schmid (AT), Vassil Kolarov (BE), Thomas Cocolios (BE), Friedrich Haug (DE), Nikolaos Manthos (GR), Balazs Ujvari (HU), Cecilia Voena (replacing Mariangela Cestelli Guidi) (IT), Ole Petter Nordahl (NO), Jose Antao (PT), Daniela Zamfir (RO), Martin Kundrat (SK), Marjan Leban (replacing Spela Stres) (SI), Manuel Moreno (ES), Michel Hubner (CH), John Millard (CH), Jan Visser (NL), Richard Farrow (UK).

Members of KT Forum MA: Thomas Schreiner (AT), Evangelia Dimovasili (CY), Karl Ziemons (DE), Nikolaos Manthos (GR), Balazs Ujvari (HU), Sebastien Incerti (replacing Denis Dauvergne) (FR), Martin Kundrat (SK), John Millard (CH), Jan Visser (NL), Paolo Crespo (PT), Osman Eroglu (TR).

Invited external speakers: Adrian Hill (UK), Philip Carvil (UK)

Invited CERN speakers: Alberto Di Meglio, Paolo Tedesco, Luigi Serio, Benjamin Frisch, Magdalena Kowalska, Thierry Stora, Alessandro Raimondo, Filipe Ramos.

Members of CERN KT Group: Manuela Cirilli, Marzena Lapka, Rita Pinho.

Others present: Markus Auer assistant ILO (AT), Nicolas Berton ILO (FR), Michel Onori Assistant ILO (IT), Enver Savas assistant ILO (TR), Anna Ferrari (CERN), Nils Hoimyr (CERN), Paul Van Uytvinck (CERN).

Minutes taking: Helen Dixon-Altaber/ Audrey Ballantine

The 6th meeting of the KT Forum dedicated to Medical Applications (MA) was chaired by Mike Lamont, CERN Director for Accelerators and Technology, and Giovanni Anelli, Leader of CERN's Knowledge Transfer group.

	Summary of the KT Forum dedicated to Medical Applications
	<p><u>Introduction KT Forum dedicated to Medical Applications (MA), Mike Lamont, Giovanni Anelli</u></p> <p>Introduction by Mike Lamont: societal impact increasingly important at CERN and MA very important part of that. Highlights being FLASH, Medical Gantries, NIMMS, spectroscopic X-ray detectors workshop.</p> <p>The minutes of the September 2021 meeting were approved, pending any comments to be given in 2 weeks.</p> <p>The agenda was approved.</p> <p>Encouragement from Giovanni Anelli for presentations of medical applications-related activities and specific needs from Member and Associate Member States at future meetings.</p> <p>Giovanni Anelli explained that the <u>Strategy and framework applicable to knowledge transfer by CERN for the benefit of medical applications</u> is being updated and invited the delegates to comment on the proposed changes. Two key points concern the handling of medical data, which should now be compliant with CERN's operational circular on the handling of sensitive data, and the proposal to replace the CMAAC (CERN Medical Applications Advisory Committee) with Medical Applications Experts who can be invited to give targeted input to the KT Forum discussions and/or to topical reviews. Also there will be updates reflecting the evolution of MA activities and some changes to CERN's organisational structure.</p> <p>No comments or questions.</p>
<p>1.</p>	<p><u>STFC Health Tech Clusters and Campus Updates, Adrian Hill, Philip Carvil</u></p> <p>Phil Carvil outlined the role of STFC and explained the Clusters model. For health and other topics (energy, space and quantum). These support communication and collaboration and enhance KT opportunities. Campus based structure: Harwell, Daresbury and Edinburgh with ecosystem of research institutes and industrial partners.</p> <p>Adrian Hill expanded on capabilities of Harwell: Specialises in manipulation of molecules of living organisms e.g., vaccines. NQCC-new centre for quantum computing and many ongoing upgrades of facilities. He highlighted some important case studies. Details can be seen in slides. He urged anyone who could see potential for international partnerships to get in touch.</p> <p>Phil Carvil then described the larger cluster in the North West.</p> <p>Karl Ziemons: Regarding the communication platform between facilities and companies. How did you make sure the information was flowing?</p> <p>Philip Carvil: The key thing for communication sharing is an active manager who facilitates this as a full-time job. Investment in human capital to facilitate communication channels as well as the tools. Share during frequent meetings etc. Need a common code of conduct so people know what they need to share.</p>

	<p>Adrian Hill: Need people on ground to network and mediate, making sure people are aware of key issues for stakeholders such as finding funding. Have events/networking to create best routes for knowledge exchange and an aligned strategy for working together.</p> <p>Osman Erogul: Thanks for presentation. You say you have collaborations with universities from UK. Can universities from elsewhere participate?</p> <p>Adrian Hill: Over 30 universities involved, some have actual labs and offices on-site, some are involved in collaborative projects, and some are users of facilities. 85% of projects are peer-reviewed, 15% are industry led at the commercial rate.</p> <p>Partners are international and national: open access environment for everyone. There are some globally unique capabilities so please get in touch if interested.</p>
<p>2.</p>	<p><u>CERN Expertise and Technology in Photonics, Filipe Ramos</u></p> <p>Giovanni Anelli introduced the talk: this is a technology area that we think could be interesting to partners in the Member States and we are asking you to let us know if anyone in your country might be interested in it.</p> <p>Michel Hubner: question regarding strategy as very different market as opposed to e.g. Hadron Therapy. A very large, complex and prosperous market and a key technology for the future. He wondered how CERN will proceed in terms of marketing strategy and business development, who will we talk to etc.?</p> <p>Filipe Ramos: at present, we are looking more at the necessities of a specific company and seeing if the technology fits their needs. Also contacting the big players in the field and inviting them to CERN to see our technologies. Then we could collaborate eg by licensing the technology.</p> <p>Giovanni Anelli: We have some ideas of what can be done with the technologies but we have limited view of what companies actually need which is why we wrote the Value Propositions which we present to companies. KT Forum role is very important as we need to make information available to companies.</p> <p>Karl Ziemons: Question about frequency shift to produce different wavelengths.</p> <p>Filipe Ramos: the technology is innovative as it can use any laser source and it filters out for the required wavelength.</p> <p>Karl Ziemons: Might be Interesting for imaging technologies like fluorescent spectroscopy.</p> <p>Jan Visser: For the fibre optics. Apart from radiation. What is the difference compared to what is available in industry eg for relative humidity?</p> <p>Filipe Ramos explained that new types of fibres are being developed eg Phaso Tvr (not the usual commercially available FPG or LPG) with more spatial resolution.</p>
<p>3.</p>	<p><u>Digital Technologies for Medical Applications: Introduction and Overview, Alessandro Raimondo</u></p> <p>Giovanni Anelli introduced topic of transferring a CERN digital technology to a medical domain. Alessandro Raimondo to give overview then a 'deep-dive' into specific projects.</p> <p><u>Questions were taken after all 3 talks</u></p> <p>Karl Ziemons: What is the philosophy? I know that you can download ROOT. Are the other tools also freely available? Can somebody else contribute?</p> <p>Alessandro Raimondo confirmed that BioDynaMo is freely available. The policy is decided on a case-by-case basis. The tools are complex to use so some CERN</p>

	<p>consultancy might be needed to use them even if open source. There are communities who are continuously developing and there is help available inside CERN.</p> <p>Sebastien Incerti (France) Impressed by BioDynaMo . Have you contacted Geant4? It would be good to make links with them.</p> <p>Alberto Di Meglio indicated that they are in discussions to understand which areas would be complementary. Having a model built with BioDynaMo and then analysed by Geant4 could be very interesting.</p>
4.	<p><u>Onboard Alberto Di Meglio, Paolo Tedesco</u></p> <p>Onboard was formerly known as CS4OD (CERN Science for Open Data)</p> <p>Thomas Cocolios: How are CERN solutions answering the questions of complexity and heterogeneity? Nice to share data and analysis but how do the tools available now deal with the heterogeneity of the data?</p> <p>Paolo Tedesco: The tool is not offering anything specific. The aim is to help researchers in importing and processing the data. Could start with statistical data and process a workflow. It is a case-by-case scenario, it doesn't homogenise data from different sources.</p> <p>Alberto Di Meglio: There are no built-in magic tools to solve complexity. It's about managing complexity not resolving it.</p>
5.	<p><u>From CAFEIN to Trustroke Luigi Serio</u></p> <p>Martin Kundrat: From Field of Diagnostic imaging, would like to know how to connect to this platform and how to have access to provide patient data? How to benefit from the Cafein project.</p> <p>Luigi Serio: Contact Alessandro Raimondo or Luigi Serio. An algorithm with model will require NDA. If it is to develop a new algorithm would need to discuss the project and how to get external funding.</p> <p>Martin Kundrat will contact them to discuss.</p> <p>Thanks from Osman Eroglu. Are you working with one dimensional signals such as ECG, EEG, EMC etc. Is there any research combining with 2 types of signals? For Siezure/ Epilepsy detection etc. could combine EEG and MRI images.</p> <p>Luigi Serio agreed that it is important to have analysis of images combined with Medical data. The TRUStroke project takes into account measurement of blood pressure, cardiac function, dietary information etc. All data go into algorithm which tells patient and doctor if increased risk of stroke.</p>
6.	<p><u>Update on Healthcare Activities Benjamin Frisch</u></p> <p>No questions</p>
7.	<p><u>High-Sensitivity Nuclear Magnetic Resonance Magdalena Kowalska</u></p> <p>Karl Ziemons: Hyper polarization is not very stable so how long can you maintain it?</p> <p>Magdalena Kowalska explained the need to encapsulate in biological cages if the time is too short e.g. for Xenon. With Nitrogen you can maintain polarisation for minutes. The study carried out with Mainz will concentrate on using PET isotopes as they are readily available.</p> <p>Question regarding the Patent share and whether any documents were published before the application.</p>

	<p>40% CERN, 40% Mainz, 20% GSI</p> <p>Magdalena Kowalska explained that no articles were published in fact the idea was patented before the work started.</p> <p>Benjamin Frisch explained that we are expecting industrial interest and would encourage the input of those present to find potential partners.</p> <p>Michel Hubner: It would be interesting to have explanation regarding patent policy at a future session.</p> <p>Giovanni Anelli agreed that we could organise a session at next KT Forum to explain. We will also send policy with the minutes.</p>
<p>8.</p>	<p><u>Update on MEDICIS and PRISMAP</u> Thierry Stora</p> <p>Karl Ziemons: Does production and labelling happen at Medicis?</p> <p>Thierry Stora: No, the radiochemistry purification is very limited so this is done elsewhere.</p> <p>Giovanni Anelli commented that it must be challenging to operate MEDICIS while depending on the CERN's accelerator schedule of shutdowns etc. and Thierry Stora confirmed it was. However, through the MEDICIS collaboration, the operation is supported by irradiations at other places, making MEDICIS a facility with unique capacities.</p>
<p>9.</p>	<p><u>Wrap up and Conclusions</u> Giovanni Anelli</p> <p>Karl Ziemons: For spectral CT, has the licence already been given to Siemens?</p> <p>Giovanni Anelli: for spectral CT, we have licensed Medipix3 to MBI (MARS Bioluminescence Imaging). For years, CERN has been running X-ray spectroscopic workshop where companies like Siemens and Phillips are invited. However, we know Siemens and Phillips are developing the technology in house. We understand that some companies might not want to work with academia. The companies confirm that they learned a lot from workshops but decided to develop internally. Being at workshop definitely had an impact as they learned there was a business opportunity using the technology but, of course, we can't force them to work with CERN.</p> <p>Giovanni Anelli urged the participants to not wait for next meeting if they have questions, they should not hesitate to contact us.</p> <p>The next meeting will be on Monday 20th March afternoon. We will aim for in person meeting.</p> <p>Meeting concluded at 5.30 p.m.</p>