



# COST

**EXTREMA**

**MP1207**

**Start date: 16/05/2013**

**End date: 15/05/2017**

**Year: 2 (started in June 2014)**

**Kees Joost Batenburg**

Chair

CWI, the Netherlands

# Scientific context and objectives

## (1/2)

- **Background / Problem statement:**
  - Communities dealing with advanced experimental X-ray tomography and with advanced image reconstruction are not well connected
  - Next generation tomography setups require combining advanced experiments with sophisticated algorithms
- **Brief reminder of MoU objectives:**
  - To establish an active, interdisciplinary research network that bridges the gap between the experimental X-ray tomography community and the mathematical image reconstruction community

# Scientific context and objectives (2/2)

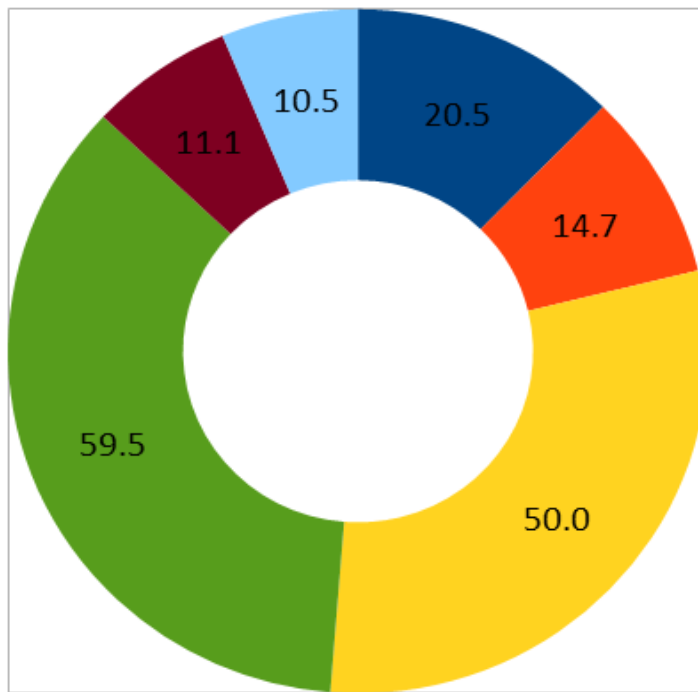
- **Research directions:**
  - Workshops are focused on establishing a common understanding of the problems involved from different perspectives, and a repository of models, software, data, and algorithms. Such a common ground for joint research did not exist before starting the Action.
  - Key direction for Year 2 is to transfer this common understanding into a joint research agenda
  - Key topics that have emerged: 4D tomography, in-vivo phase contrast tomography. The EXTREMA network is uniquely positioned to deal with the broad scope of these directions.

# Working groups (1/2)

	Software and data exchange	Quantitative modelling	Algorithm development
	W1	W2	W3
Absorption and phase contrast T1			
Diffraction contrast T2			
Fluorescence contrast T3			

# Working groups (2/2)

Involvement in working groups



- Software and Data Exchange
- Quantitative Modeling
- Algorithm Development.
- Absorption and phase contrast tomography
- Diffraction contrast tomography
- Fluorescence contrast tomography



# Results vs. Objectives

- **Progress towards reaching the Action scientific objectives**
  - Action events brought together a new interdisciplinary community of X-ray tomography researchers
  - Repositories have been setup and populated for problems/models/data/algorithms repositories on the topics of 4D tomography, in-vivo phase contrast tomography, and fluorescence contrast tomography, with contributions from many researchers.
- **Added value of networking**
  - The majority of event participants had not been in contact before, and never would have been when visiting their main conferences.

# Significant Highlights in Science and Networking (1/3)

- Web-based problem repositories for collecting models/data/algorithms

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XSD 4D Imaging Collaboration

Pages

Blog

CHILD PAGES

Pages

Home

- 3D tomographic reconstruction f...
- 3D tomographic reconstruction f...
- Ad-hoc high speed tomography...

8 more child pages

Space tools

- Per Christian Hansen DTU Compute Technical University of Denmark pcha@dtu.dk
- Daniil Kazantsev, PDRA at the Uni of Manchester, daniil.kazantsev@manchester.ac.uk

Projects

- Foams and Lungs -- analytic compensation of deterministic motion
- Liquid foams undergoing relaxation / coarsening
- Fast tomography of foams is noisy
- Determination of the optimal high speed tomography data collection parameters
- Marker-less alignment methods for synchrotron and laboratory CT datasets
- 3D tomographic reconstruction for noise reduction
- 3D tomographic reconstruction for boundary enhancement
- Advanced flat-field correction for tomographic data

Data upload and download

Algorithms & Software

Single rotating X-ray source

Ring of multiple X-ray sources

Ring of X-ray sensors

The RTT real time tomography system by William Thompson

# Significant Highlights in Science and Networking (2/3)

- 5-day Lorentz Workshop
  - Intensive discussions on algorithms, experiments, models, bringing together the separate communities
  - Over 50% ESR
  - Quote from a senior participant: “Best workshop I have been to in many years”
  - Speeddating was very much appreciated



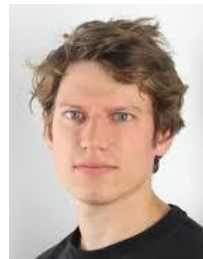


# Significant Highlights in Science and Networking (3/3)

- Many new, interdisciplinary collaborations have been established.
- Example: Daniel Pelt (CWI) now collaborates with Julian Moosmann (KIT) and Goran Lovric (PSI) on neural network reconstruction for low-dose in-vivo tomography (supported by 2 STSM's)



Daniel Pelt, CWI



Julian Moosmann, KIT



Goran Lovric, PSI



# Future Plans

- **Critical phases to be implemented or topics to be addressed for the upcoming year**
  - Joint experimental and computational “work”shop at ESRF (with actual collaborative work being done on-site)
  - Increase number of STSMs by raising awareness
  - Establish collaborations with industry through dedicated industrial tomography workshop
  - Stimulate discussion on joint funding opportunities



# *Appendix*

- The following three slides should be prepared for information only in case of questions from the DC but should NOT be presented



# Action Parties

## Member countries:

At beginning of Year 1: **17**  
At end of Year 1: **20**  
From non-COST countries: **0**

## Grant Holder:

Name of GH Institution: **CWI**  
Name of GH Scientific Representative:  
**Kees Joost Batenburg**  
Name of GH Country: **Netherlands**



# Action participants

## Participants after Year 1:

Total:	<b>190</b>
Early Stage Researcher:	<b>77 ( = 40.5%)</b>
Female:	<b>48 ( = 25.3%)</b>

# Use of COST Instruments

Activity (No.)	Year 1	Year 2	Year 3	Year 4
MC/WG Meetings	2			
STSMs	8			
Training Schools	2			
Workshops or Conferences	3			
Joint Publications	6 (accepted) 2 (submitted)			