



Training and Research in Unconventional Computation in Europe

Project Overview

Coordinator - Martyn Amos, MMU



FP7 – ICT: Coordinating Communities, Identifying new research topics for the FET Proactive Initiatives and Fostering Networking of National and Regional Programmes
Project no. 318235



Unconventional Computation

WHAT IS "Unconventional Computation" (UComp)

Work Programme 2001-2012 - Objective ICT-2011 9.6

Nature (e.g. living cells), and our physical environment in general, show many unconventional ways of information processing, such as those based on (bio-)chemical, natural, wetware, DNA, molecular, amorphous, reversible, analogue computing, etc. These are generally very sophisticated, ingenious and highly effective for specific purposes, but sufficient knowledge (either from a theoretical or an engineering perspective) to properly exploit, mimic, or adapt these systems, is lacking.

Objective

The objective is to develop alternative approaches for situations or problems that are challenging or impossible to solve with conventional methods and models of computation (i.e. von Neumann, Turing). Typical examples include computing in vivo, and performing massively parallel computation. The focus of this objective is beyond existing initiatives (e.g. Quantum ICT, Neuro-IT and [Brain-Inspired ICT](#)).

Target outcomes

Foundations for a radically new kind of information processing technology based on unconventional paradigms. The proposed concept should be developed within the framework of a broader, long-term vision on its potential implementation and impact.

Projects should

- pursue information processing, respecting the link between computation and the physico-chemical properties of its embodiment.
- strengthen the theoretical foundations in the area, keeping a strong focus on their potential application in (future) systems and devices.
- demonstrate key steps towards physical information processing systems, including appropriate construction, organisation, adaptation and operation methodologies.
- develop an appropriate interface to conventional IT systems and devices, wherever relevant

Expected impact

- ✦ Foundations, approaches and proofs of concept for radically new kinds of computation.
- ✦ Possible contributions beyond the area of ICT (e.g. health, environment or security).
- ✦ Global international research cooperation in this area, in particular with participants from the USA, Canada, New Zealand and Japan.



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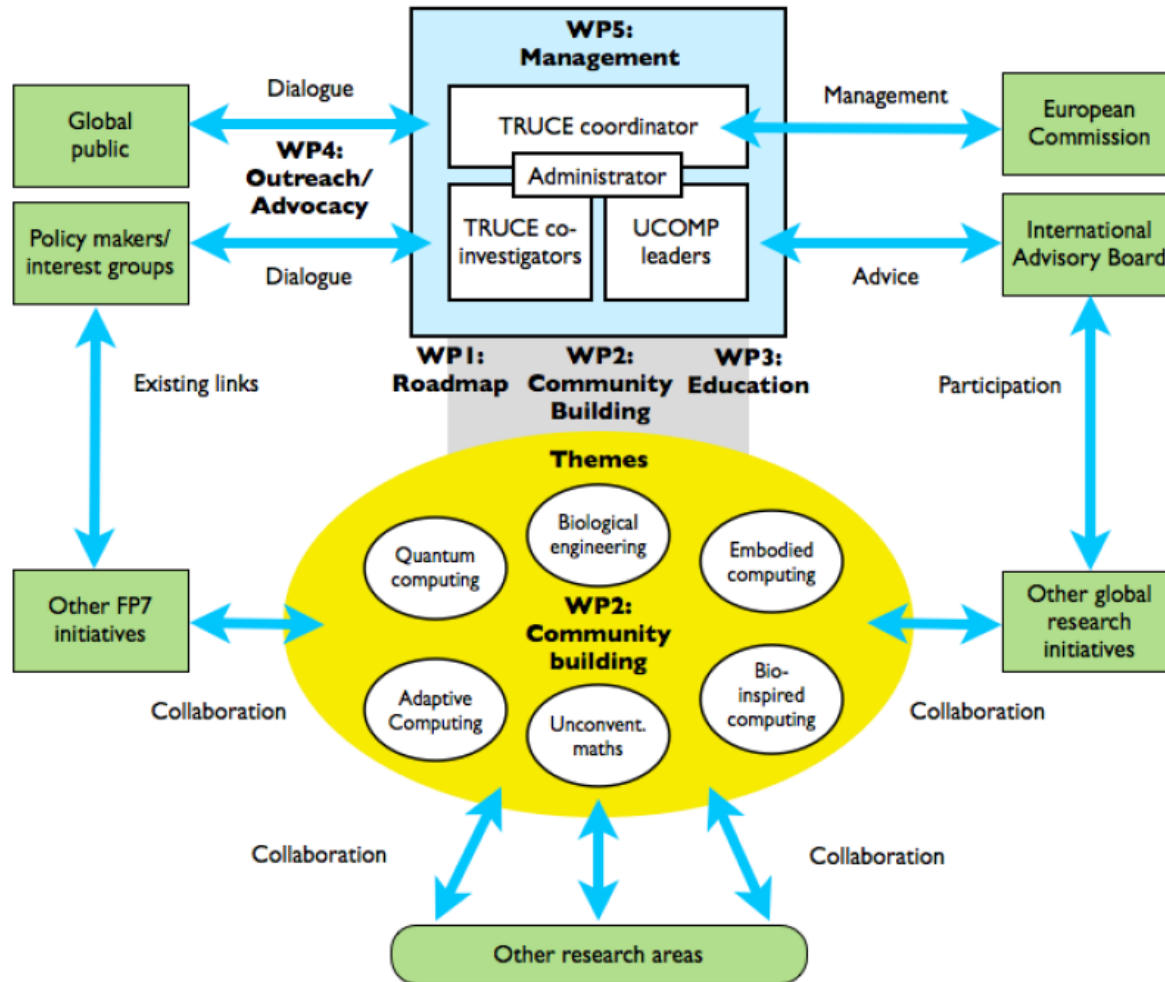


Purpose

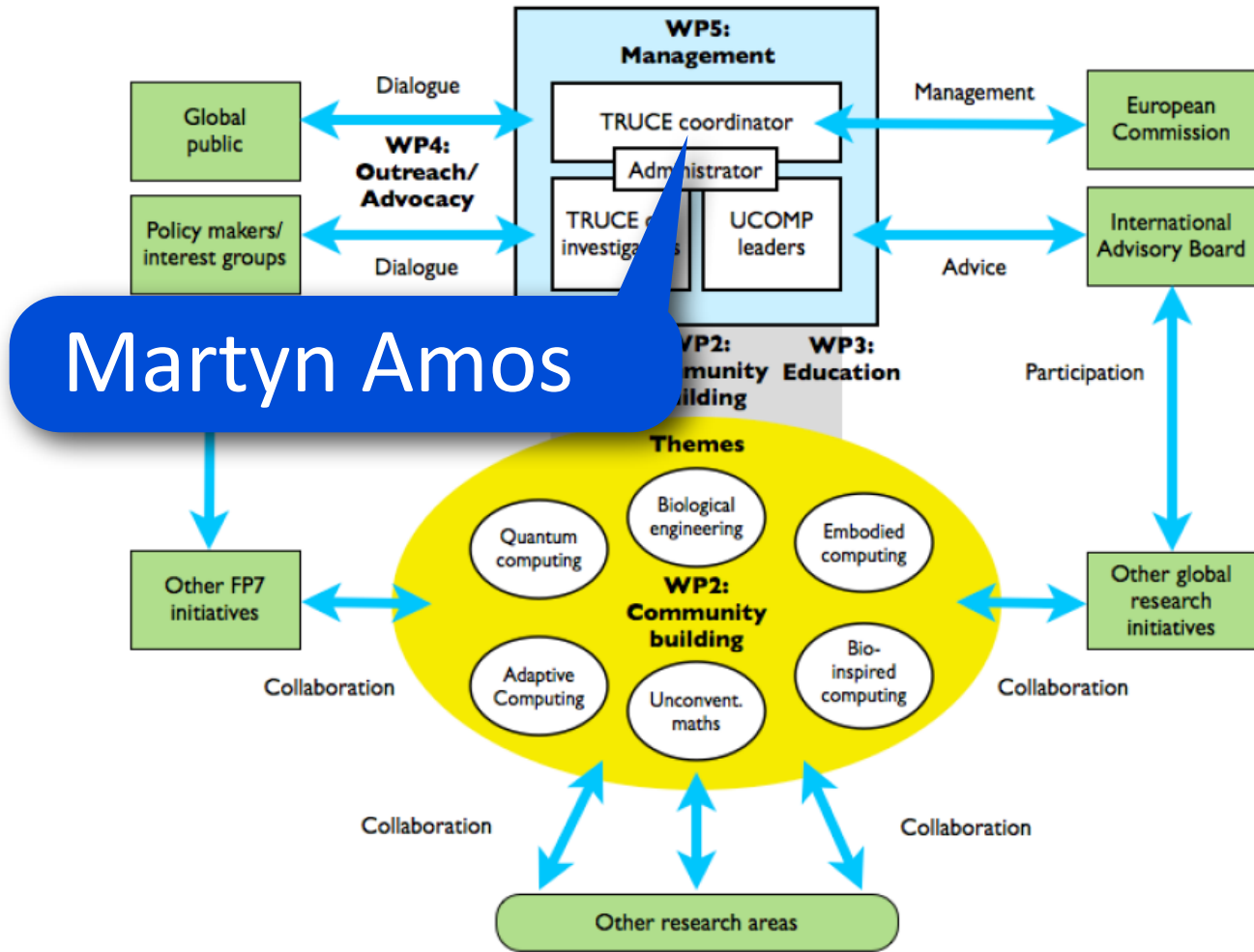
- Formulate, develop and maintain a *European vision and strategy* for UCOMP
- Identify areas of importance in UCOMP, and help to *focus research* in these areas
- Provide a framework for the *discussion and resolution* of current issues in UCOMP
- Facilitate improvement in the *quality, profile and applicability* of European UCOMP research
- Encourage and support the involvement of *students and early career researchers* in UCOMP
- Facilitate *industrial involvement* with UCOMP



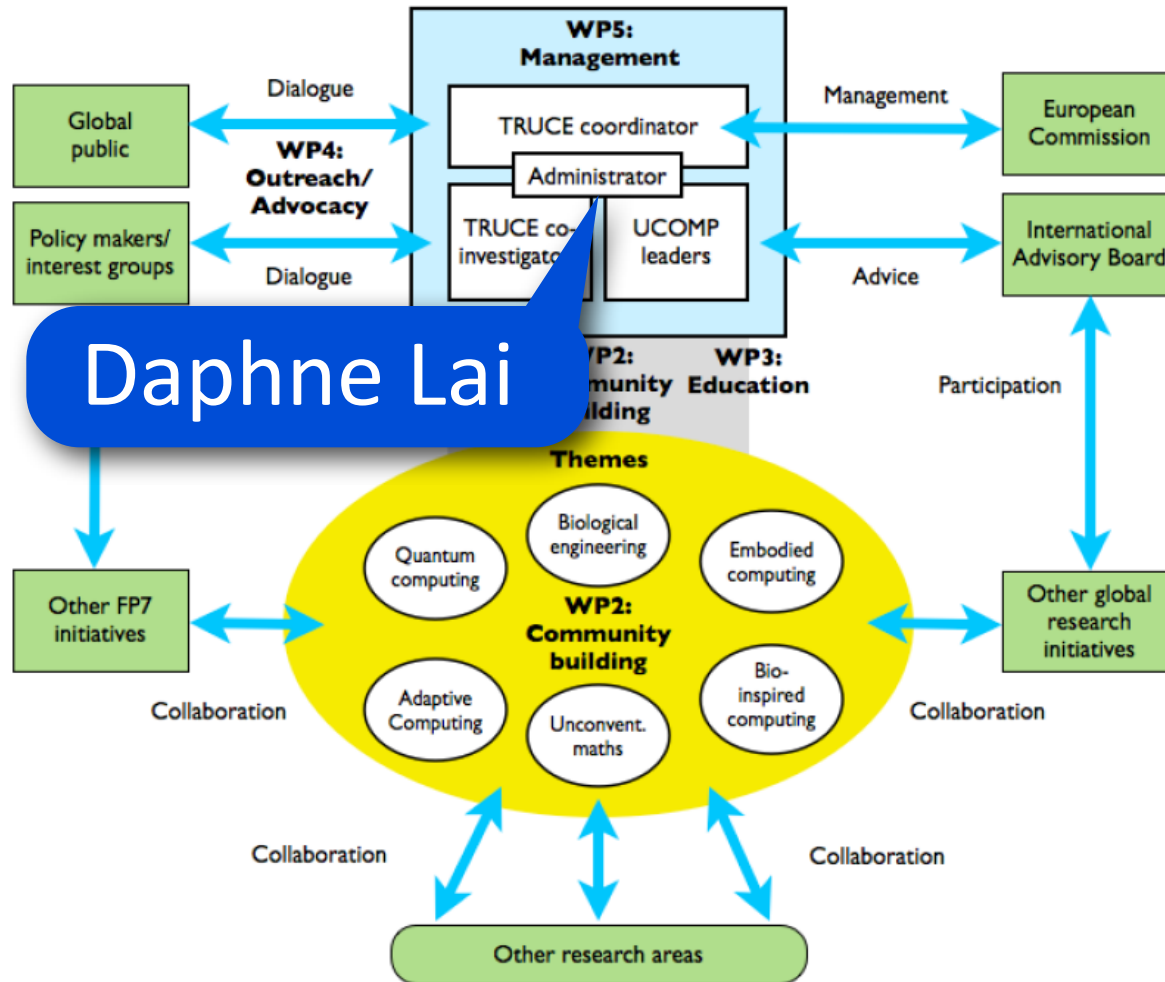
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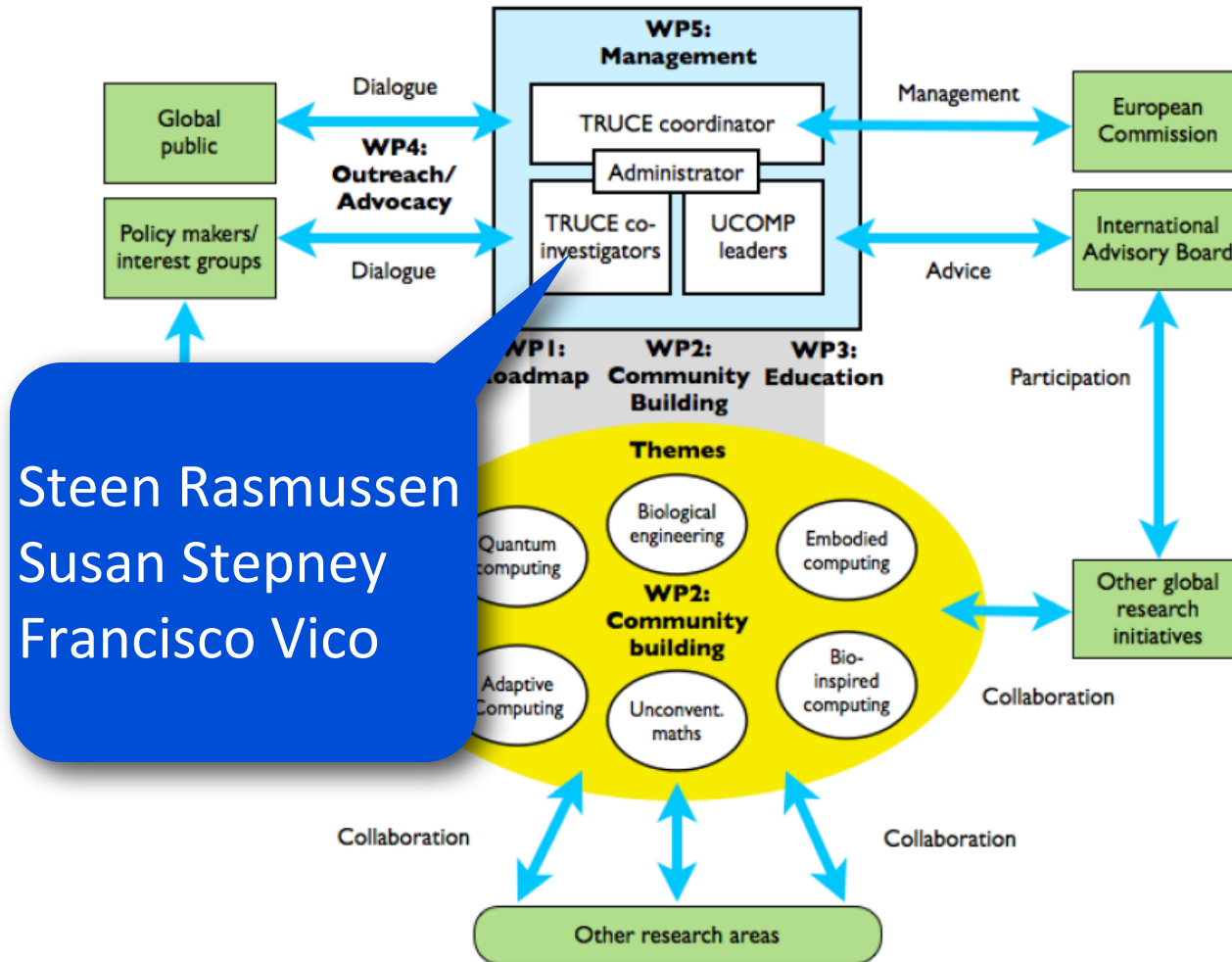
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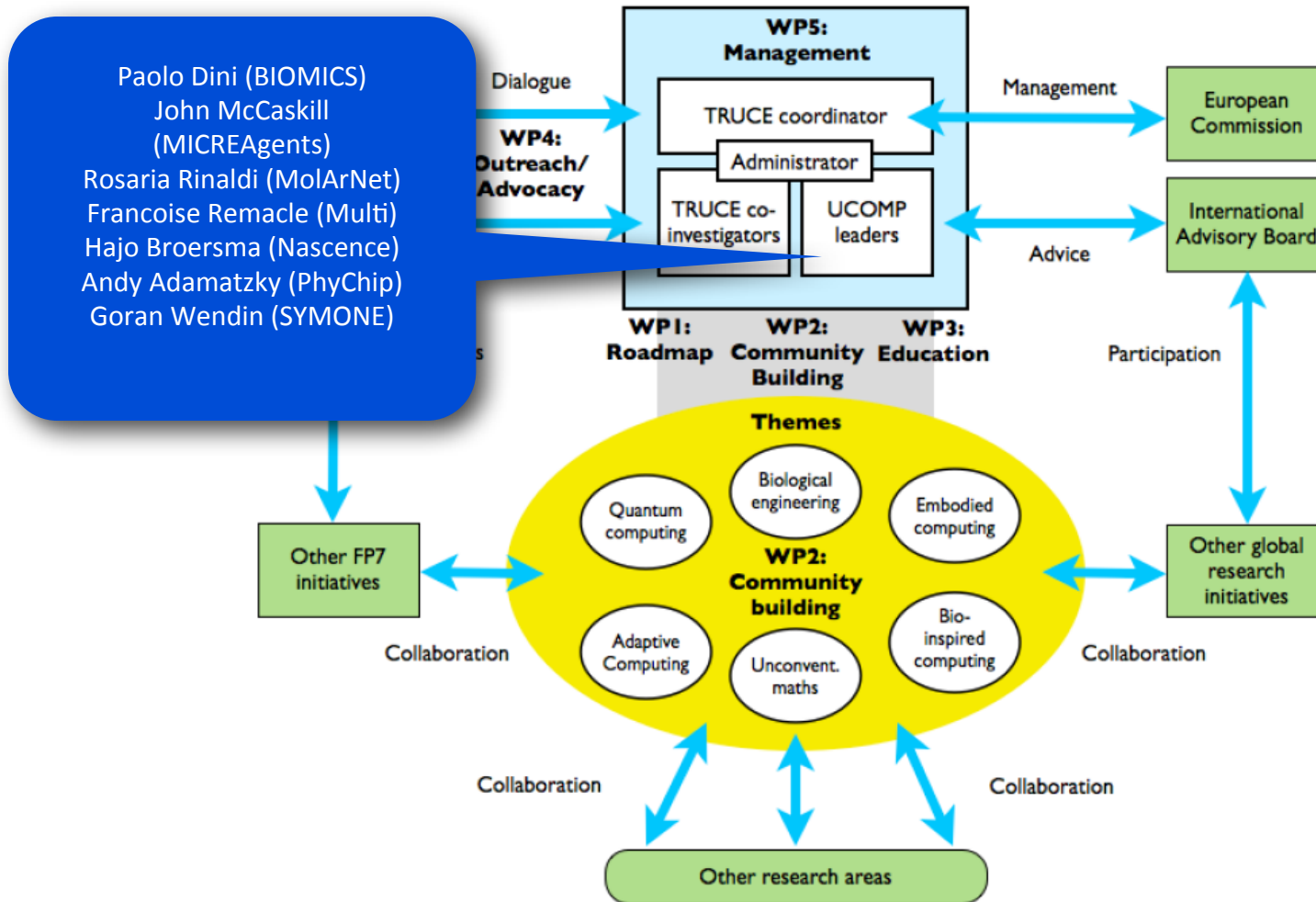
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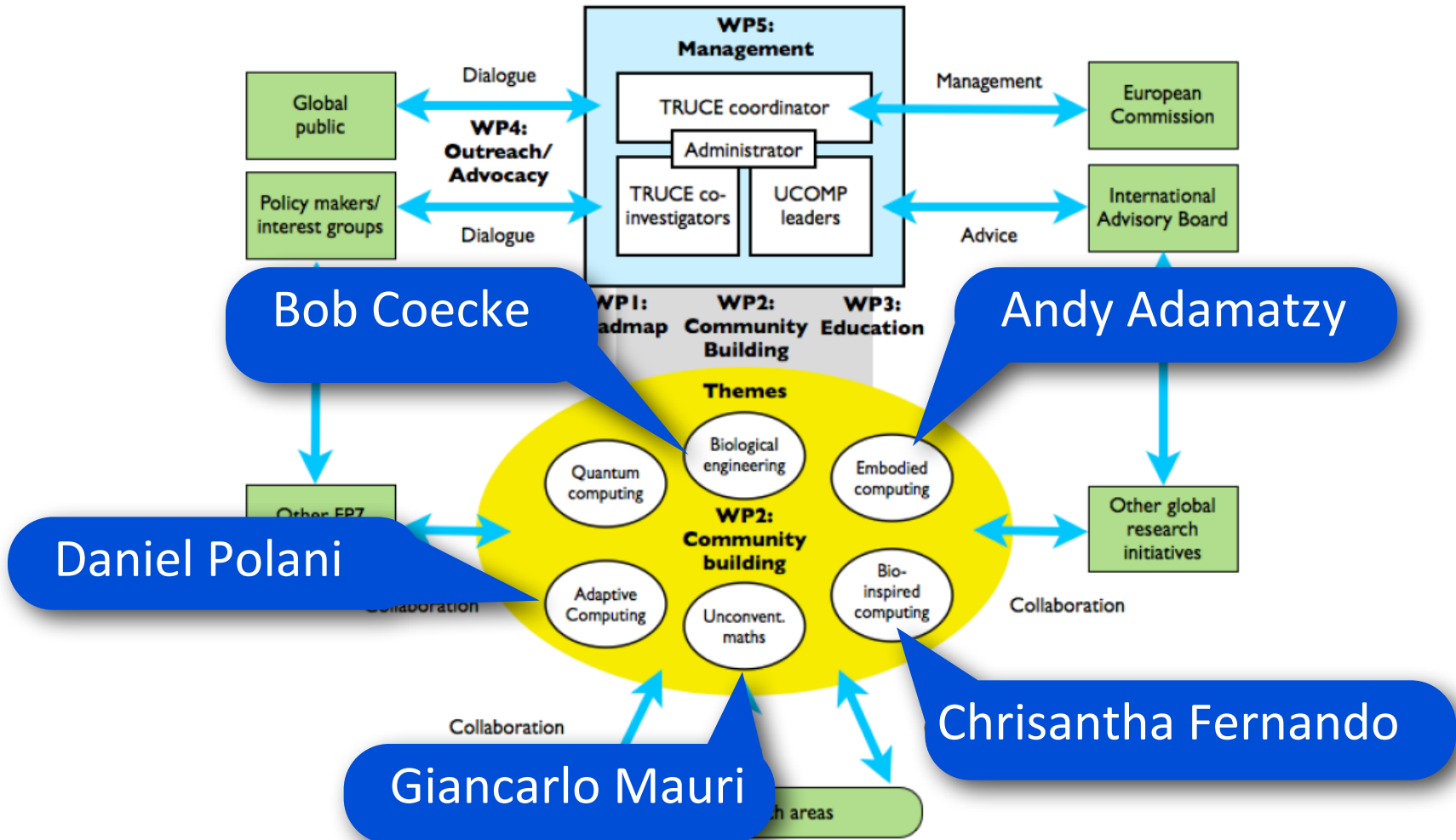
Steen Rasmussen
Susan Stepney
Francisco Vico



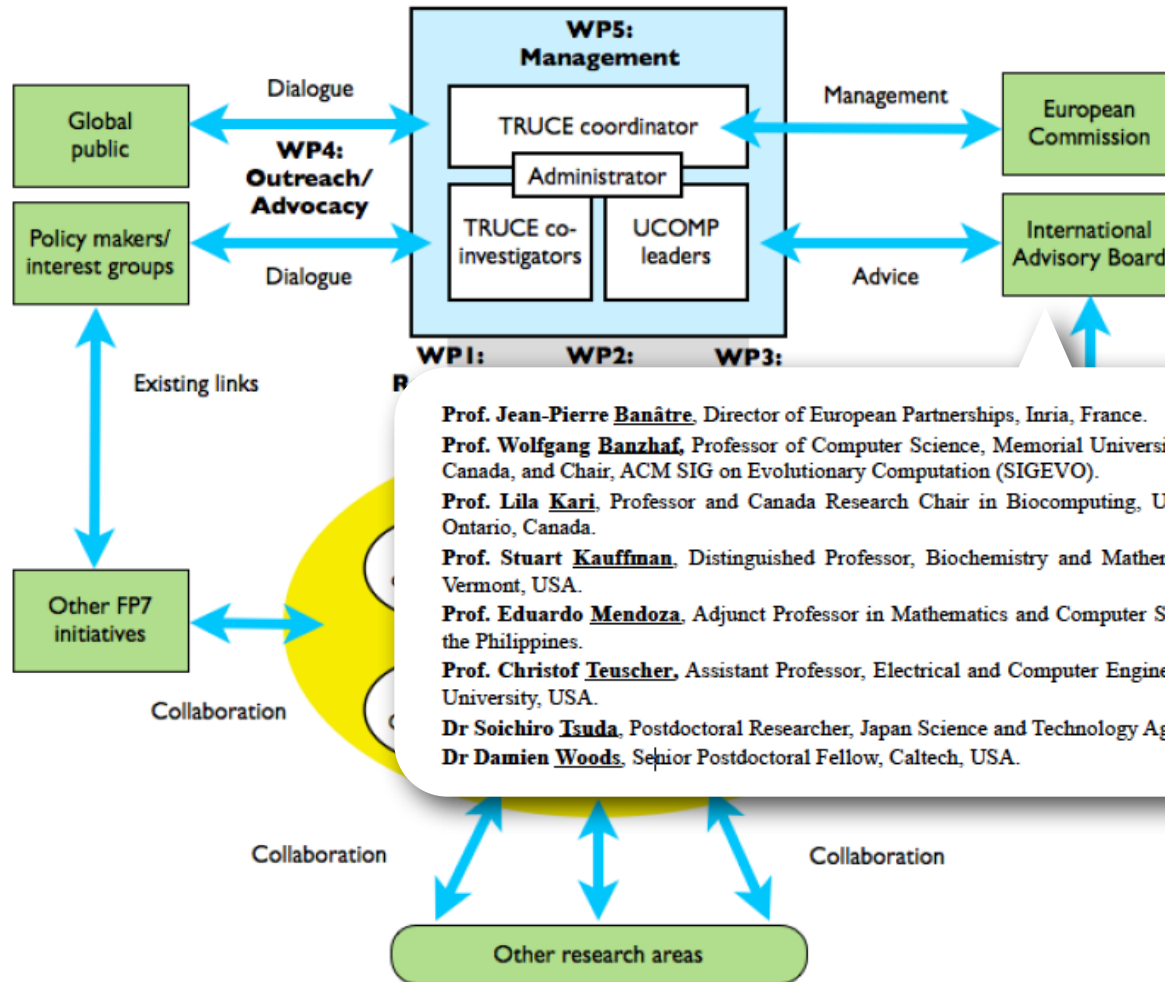
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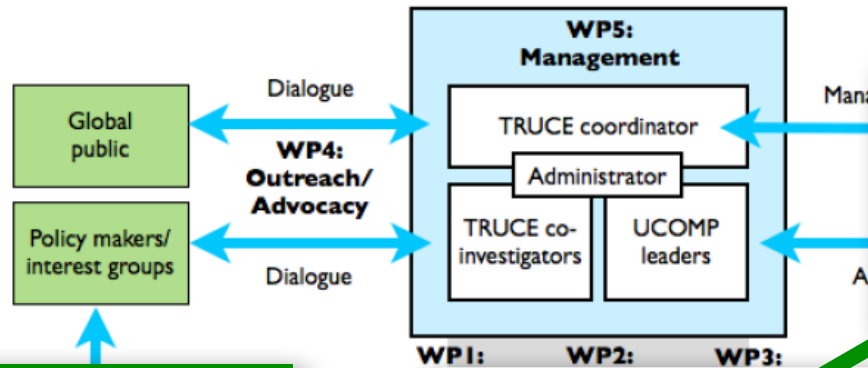
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Prof. Jean-Pierre Banâtre, Director of European Partnerships, Inria, France.
Prof. Wolfgang Banzhaf, Professor of Computer Science, Memorial University of Newfoundland, Canada, and Chair, ACM SIG on Evolutionary Computation (SIGEVO).
Prof. Lila Kari, Professor and Canada Research Chair in Biocomputing, University of Western Ontario, Canada.
Prof. Stuart Kauffman, Distinguished Professor, Biochemistry and Mathematics, University of Vermont, USA.
Prof. Eduardo Mendoza, Adjunct Professor in Mathematics and Computer Science, University of the Philippines.
Prof. Christof Teuscher, Assistant Professor, Electrical and Computer Engineering, Portland State University, USA.
Dr Soichiro Tsuda, Postdoctoral Researcher, Japan Science and Technology Agency, Osaka, Japan.
Dr Damien Woods, Senior Postdoctoral Fellow, Caltech, USA.



Structure



Invited TRUCE to organize a satellite workshop at UCNC Ontario, which she is organizing...

Both attended the 2012 Frontiers of Natural Computing Workshop, held in York, and organized by Susan Stepney, just before the start of TRUCE

- Prof. Jean-Pierre Banâtre, Director of European Partnerships, Inria, France.
- Prof. Wolfgang Banzhaf, Professor of Computer Science, Memorial University of Newfoundland, Canada, and Chair, Adjunct SIG on Evolutionary Computation (SIGEVO).
- Prof. Lila Kari, Professor and Canada Research Chair in Biocomputing, University of Western Ontario, Canada.
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- Dr Soichiro Tsuda, Postdoctoral Researcher, Japan.
- Dr Damien Woods, Senior Postdoctoral Fellow, Japan.

...possible invited speaker?

Collaboration

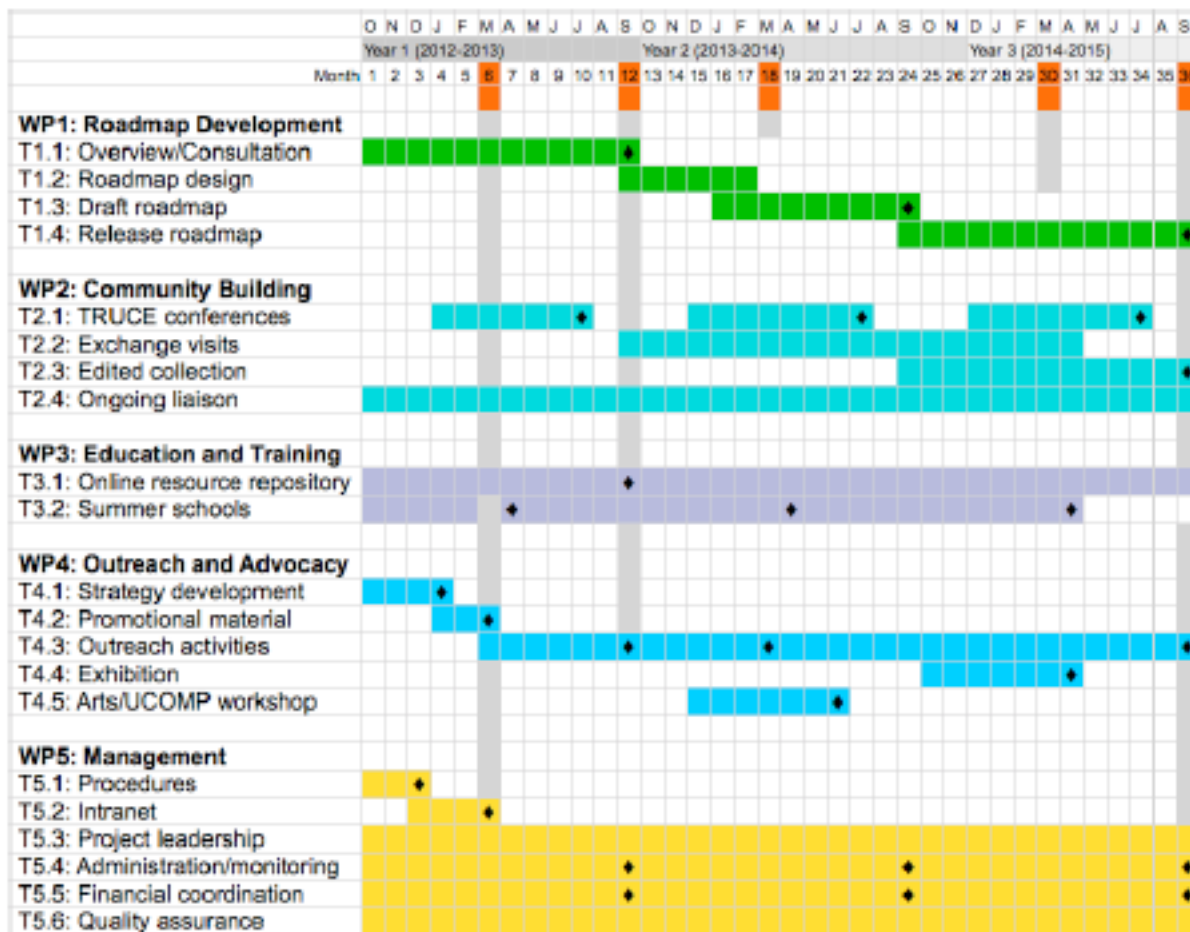
Other research areas



Work

- *Roadmap*: definitive document, describing milestones, challenges, critical factors, etc. for UCOMP
- *Community building*: conferences, exchange visits, collected volume, themes
- *Education/training*: courseware repository, summer schools
- *Outreach/advocacy*: public engagement, policy discussions, etc.





Budget

Beneficiary number	Beneficiary short name	Estimated eligible costs (whole duration of the project)					Total costs	Requested EU contribution (€)
		Effort (PM)	Personnel costs (€)	Subcontracting (€)	Other Direct costs (€)	Indirect costs OR lump sum, flat-rate or scale-of-unit (€)		
1	MMU	39.00	133,825.00	0.00	90,499.00	44,864.00	269,188.00	240,025.00
2	YORK	6.50	43,606.00	0.00	18,174.00	12,356.00	74,136.00	66,104.00
3	UMA	6.50	20,000.00	0.00	73,550.00	18,710.00	112,260.00	100,098.00
4	SDU	6.50	67,500.00	0.00	28,550.00	19,210.00	115,260.00	102,773.00
Total		58.50	264,931.00	0.00	210,773.00	95,140.00	570,844.00	509,000.00



Expected impacts

- Reinforced coordination of research projects in FET Proactive Initiatives in current or previous calls, strengthening research excellence and co-operation with partners from outside Europe
- Early identification and increased awareness of new trends emerging on a global scale in support of future proactive initiatives
- Novel widely supported and well motivated research topics to be considered as inputs for future ICT work programmes
- Increased visibility of the FET community and links between European research communities

