

# DFG Priority Program 1183

## Organic Computing

program/steering committee:

**Christian Müller-Schloer**  
**Hartmut Schmeck (Coordinator)**  
**Theo Ungerer**

**13<sup>th</sup> Colloquium**

Universität Erlangen-Nürnberg  
Nürnberg, September 15/16, 2011

# This Final colloquium:

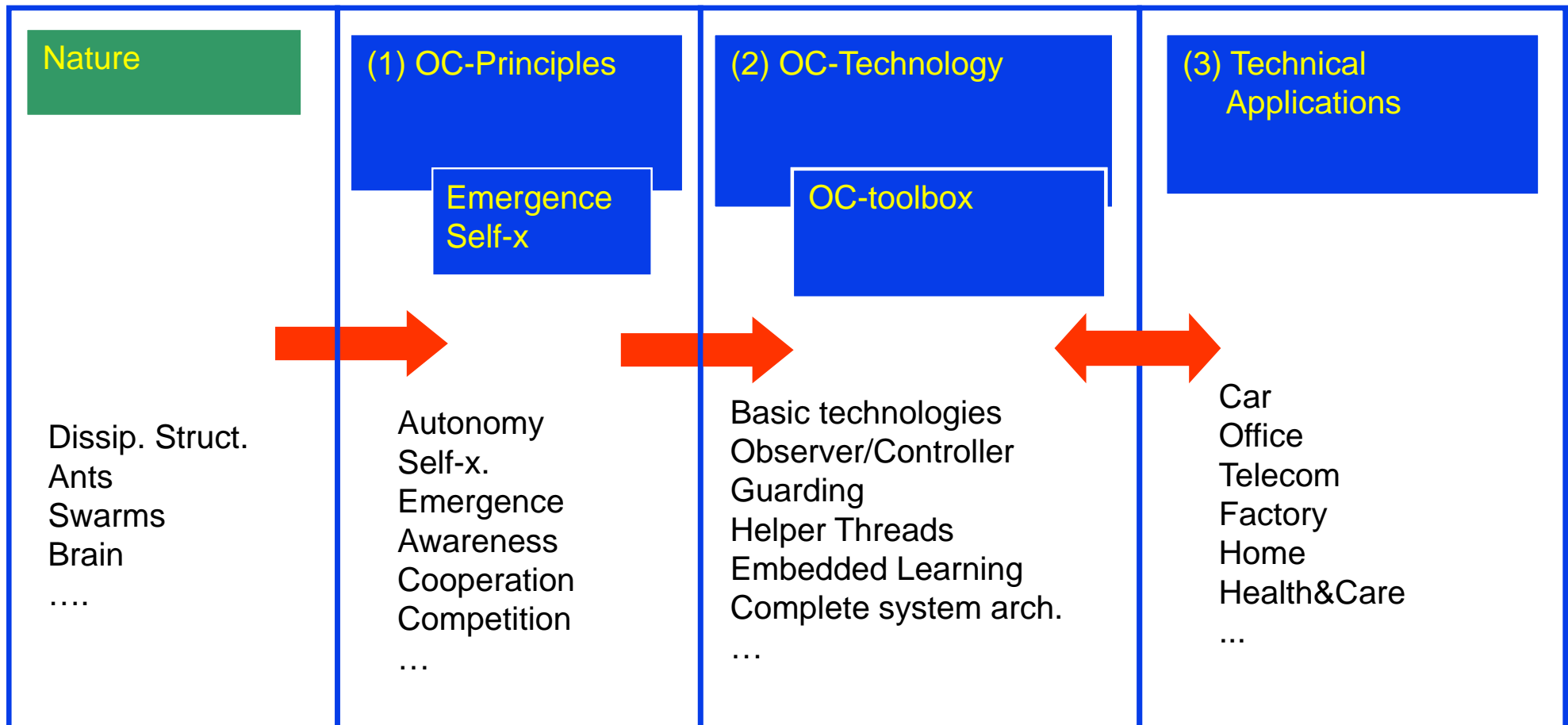
- Major topic: **Status of the projects of the priority program**
- Special thanks to the local organization team:  
Jürgen Teich and Sonja Heidner
- Many thanks also to Lei Liu for central coordination

# Brief reminder:

DFG priority program 1183 „Organic Computing“ (2005 – 2011)

[www.organic-computing.de/SPP](http://www.organic-computing.de/SPP)

*Program structure and objectives ...*



# What did we promise?

Citation from the initial proposal:

„The overall objective of the planned priority program is the realisation of innovative computer and system architectures which correspond to the vision of „organic computing“. Here, an organic computer is defined to be a self-organising system adapting dynamically to environmental requirements. Hence, infrastructures for organic information processing will be self-configuring, self-optimising, self-healing, self-protecting and also self-explaining. Self-organisation and adaptivity with all their facets will not only determine the system as a whole but the behaviour of every component of a future organic information processing system.“

- **We have worked on this for 6 years, let us look at what we have achieved!**

# Phase III: 18 Projects

- **Learning to Look at Humans** (Würtz, Uni Bochum)
- **Model-Driven Development of Self-Organizing Control Applications** (Heiß, Mühl, TU Berlin, Weis Uni Duisburg)
- **Organic Fault-Tolerant Control Architecture for Robotic Applications** (Maehle, Brockmann, Uni Lübeck, Großpietsch FhG, St. Augustin)
- **Smart Teams: Local, Distributed Strategies for Self-Organizing Robotic Exploration Teams** (Meyer auf der Heide, Schindelhauer, Uni Paderborn)
- **Formal Modeling, Safety Analysis, and Verification of Organic Computing Applications – SAVE ORCA** (Reif, Uni Augsburg)
- **Embedded Performance Analysis for Organic Computing** (Ernst, TU Braunschweig)
- **OCCS - Observation and Control of Collaborative Systems** (Branke, Warwick; Schmeck, KIT; Hähner, Müller-Schloer Uni Hannover)
- **OTC<sup>2</sup> - Organic Traffic Control Collaborative** (Hähner, Müller-Schloer, Uni Hannover, Branke, Warwick; Schmeck KIT)
- **AUTONOMOS: A distributed and self-regulating approach for organizing a large system of mobile objects** (Fekete, TU Braunschweig, Fischer, Uni Lübeck)
- **Architecture and Design Methodology for Autonomic System on Chip** (Rosenstiel, Uni Tübingen, Herkersdorf, TU München)
- **Multi-Objective Intrinsic Evolution of Embedded Systems (MOVES)** (Platzner, Uni Paderborn)
- **OC<sub>μ</sub> - Organic Computing Middleware for Ubiquitous Environment** (Ungerer, Uni Augsburg)
- **The bio-chemical information processing metaphor as a programming paradigm for organic computing** (Dittrich, Uni Jena)
- **On-line Fusion of Functional Knowledge within Distributed Sensor Networks** (Sick, Uni Passau)
- **A Modular Approach for Evolving Societies of Learning Autonomous Systems** (Rammig, Kleinjohann, Uni Paderborn)
- **Digital On-Demand Computing Organism for Real-Time Systems** (Becker, Henkel, Karl, Uni Karlsruhe, Brinkschulte, Uni Frankfurt)
- **Emergent radio: Emergent strategies to optimise collaborative transmission schemes** (Beigl, KIT)
- **Organic Self-organizing Bus-based Communication Systems** (Teich, Uni Erlangen)

# Major activities of the SPP:

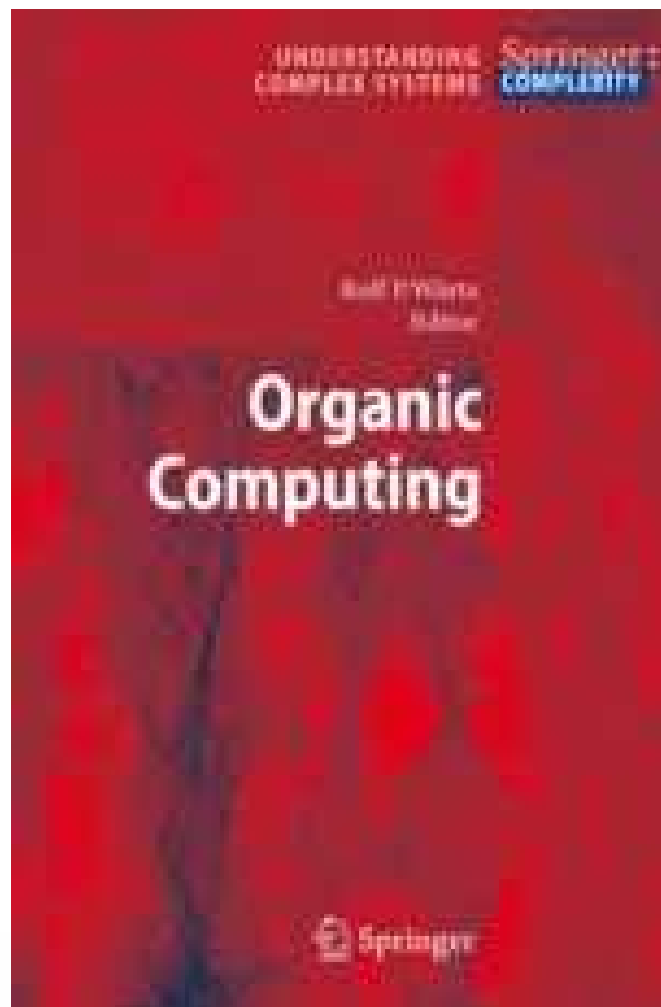
- SPP colloquia
  - Karlsruhe, Sept 2005 (EnBW)
  - Munich, Feb 2006 (BMW)
  - Stuttgart, Sept 2006 (Bosch)
  - Berlin, Feb 2007 (DLR)
  - Lübeck, Sept 2007 (TZL, Olympus, Tradac, GVZ)
  - Paderborn, Mar 2008 (Fujitsu Siemens)
  - Rüslikon, Sept 2008 (IBM)
  - Bochum, Feb 2009 (L1 Identity Solutions)
  - Augsburg, Sept 2009
  - Hannover, Mar 2010 (together with ARCS)
  - Munich, Oct 2010 (Siemens)
  - Karlsruhe, June 2010 (together with ICAC)
  - Nürnberg, Sept 2011

## Major activities of the SPP:

- Many Mini Workshops on cross-section topics
- Dagstuhl Seminars on Organic Computing
- Significant influence on international conferences:
  - ARCS
  - ATC
  - BICC
  - ICAC
  - SASO
  - ...
- Large number of publications on OC (how many???)
- Large number of Ph.D.s (how many???)
- New courses in our curricula (how many courses on OC???)
- „spin-off“ projects (new projects that have been influenced significantly by OC concepts) (which ones?)

## Major activities of the SPP:

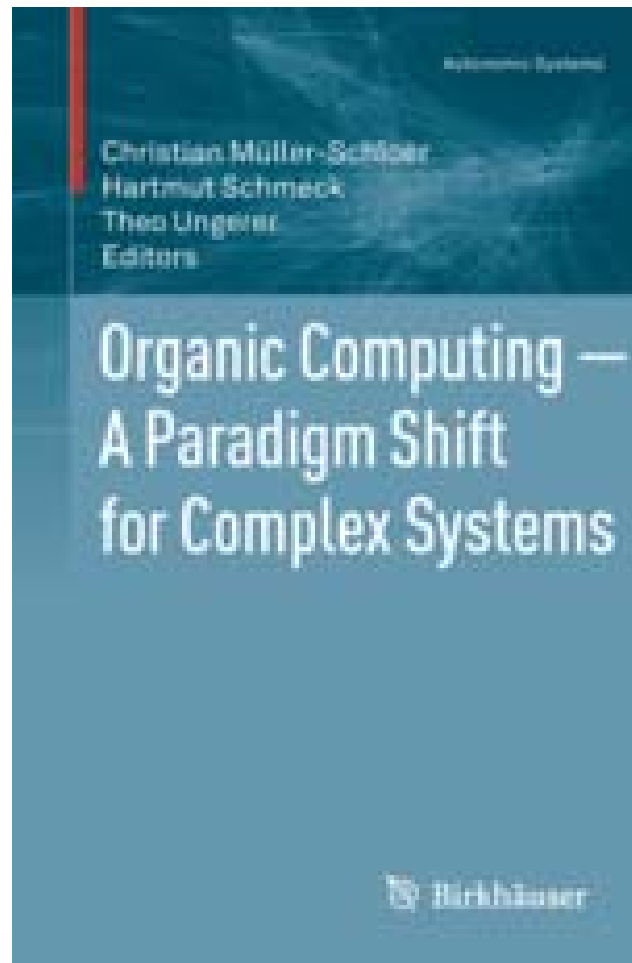
- An early book on OC:  
**Organic Computing (R. Würtz (ed), 2008)**  
**series: Understanding complex systems, Springer, 356 pages**





# Major activities of the SPP:

- A final compendium on OC:  
**Organic Computing – A Paradigm Shift for Complex Systems.  
Autonomic Systems, Birkhäuser/Springer, 627 pages**



# This colloquium:

## Organisational remarks:

- **Settlement of travel expenses:**

- Fill in travel expense forms (should be in your bag)
- Attach all relevant tickets and bills (originals, no copies)

- Send to

Karlsruher Institut für Technologie (KIT)  
Institut AIFB – Geb. 05.20  
KIT-Campus Süd  
Sekretariat LS1

76128 Karlsruhe

**(use preaddressed envelope)**

- **To make your presentation available, copy it onto the memory stick of Lei Liu, please (or send it to him)  
The presentations will be transformed to pdf and then made available on the SPP OC website.**

# Organizational issues:

- Evening event:

**Starting 7 pm (19:00 h)**

- Guided Tours of Rock-Cut Beer Cellars/Brewery
- Dinner
- Altstadthof  
Bergstr. 19



# Organizational issues:

## WLAN Access

- Individual accounts at FAU-Kongress
- Account / password at the back of your name badge

## Lunches

- Tickets for the Mensa are in your bag
- There will be guides (but the location is also indicated in the map)

# Detailed Program:

## Thursday, September 15, 2011:

9:30 h Opening and Welcome (Jürgen Teich, Hartmut Schmeck)

### *Session I*

09:45 – 10:30 **Invasion: Application-Driven Resource Management for Future MPSoCs** (Jürgen Teich)

10:30 – 11:00 **Organic self-organizing bus-based communication systems** (Jürgen Teich)

11:00 h Coffee Break

### *Session II*

11:30 **Multi-objective intrinsic evolution of embedded systems - MOVES** (Marco Platzner)

12:00 h Lunch Break

# Detailed Program:

**Thursday, September 15, 2011:**

## *Session III*

13:30 **Organic fault-tolerant control architecture for robotic applications**

(Werner Brockmann, Erik Maehle)

14:00 **Formal modeling, safety analysis, and verification of organic computing applications - SAVE ORCA** (Wolfgang Reif)

14:30 **On-line fusion of functional knowledge within distributed sensor networks**  
(Bernhard Sick)

15:00 h **Coffee Break**

## *Session IV*

15:30 **The bio-chemical information processing metaphor as a programming paradigm for organic computing III** (Peter Dittrich)

16:00 **OTC3 – organic traffic control collaborative**

(Jürgen Branke, Jörg Hähner, Christian Müller-Schloer, Hartmut Schmeck)

16:30 **OCCS – observation and control of collaborative systems**

(Jürgen Branke, Jörg Hähner, Christian Müller-Schloer, Hartmut Schmeck)

17:00 **Embedded performance analysis for organic computing** (Rolf Ernst)

17:30 **Coffee Break**

**19:00 h Social Event: Guided Tours of Rock-Cut Beer Cellars/Brewery  
with Dinner @ Altstadt**

# Detailed Program

**Friday, September 16, 2011**

*Session V*

8:30 **Architecture and design methodology for autonomic system on chip (ASoC)** (Andreas Herkersdorf, Wolfgang Rosenstiel)

9:00 **Emergent radio: Emergent strategies to optimise collaborative transmission schemes** (Michael Beigl)

9:30 – 10:00 **A modular approach for evolving societies of learning autonomous systems** (Bernd Kleinjohann, Franz J. Rammig)

10:00 h **Coffee Break**

*Session VI*

10:30 **Smart teams: local distributed strategies for self-organizing robotic exploration teams** (Friedhelm Meyer auf der Heide, Christian Schindelhauer)

11:00 **AUTONOMOS: A distributed and self-regulating approach for organizing a large system of mobile objects** (Sandor Fekete, Stefan Fischer)

11:30 **Digital on-demand computing organism: stability and robustness** (Jürgen Becker, Uwe Brinkschulte, Jörg Henkel, Wolfgang Karl)

12:15 h **Lunch Break**

# Detailed Program

Friday, September 16, 2011

## *Session VII*

13:30 Organic computing middleware for ubiquitous environments  
(Theo Ungerer)

14:00 Learning to look at humans (Rolf P. Würtz)

14:30 Model-driven development of self-organizing control applications  
(Hans-Ulrich Heiß, Gero Mühl, Jan Richling, Arno Wacker, Torben Weis)

15:00 h Concluding Remarks



## Final remarks

- Quo vadis Organic Computing??
  - For answers wrt future topics of research → Compendium!
  - We should provide an organizational framework for continuing the OC activities
    - Establish a **Working Group on OC** within GI TI
  - Organize more Dagstuhl Seminars on OC and beyond
  - Have regular workshops/sessions on OC at
    - ARCS
    - ICAC
    - SASO
    - ...

## Final remarks

- This SPP has managed to establish Organic Computing as a new branch of research in Informatics, it's origin was our systematic brain storming on future topics for research in Computer Engineering (back in 2002)
- There are many key persons who contributed essentially to make this possible, I would like to thank especially
  - Christian Müller-Schloer for his many inspiring ideas and his essential role in writing the “position paper on OC” and in organising our final compendium,
  - Christian Müller-Schloer and Theo Ungerer for the perfect cooperation in the “program committee” of the SPP,
  - the international team of reviewers and the DFG staff for their support of our research
  - and, finally, all of you for your active contributions to the activities of this priority program, it has been a pleasure for me to cooperate with you.

## Final remarks

- I will ask you to send me data on “key performance indicators” of this SPP for inclusion in my final report.
- Thanks again to Jürgen Teich and his team for the perfect environment for this final colloquium and the deep experience of last night’s special event!

