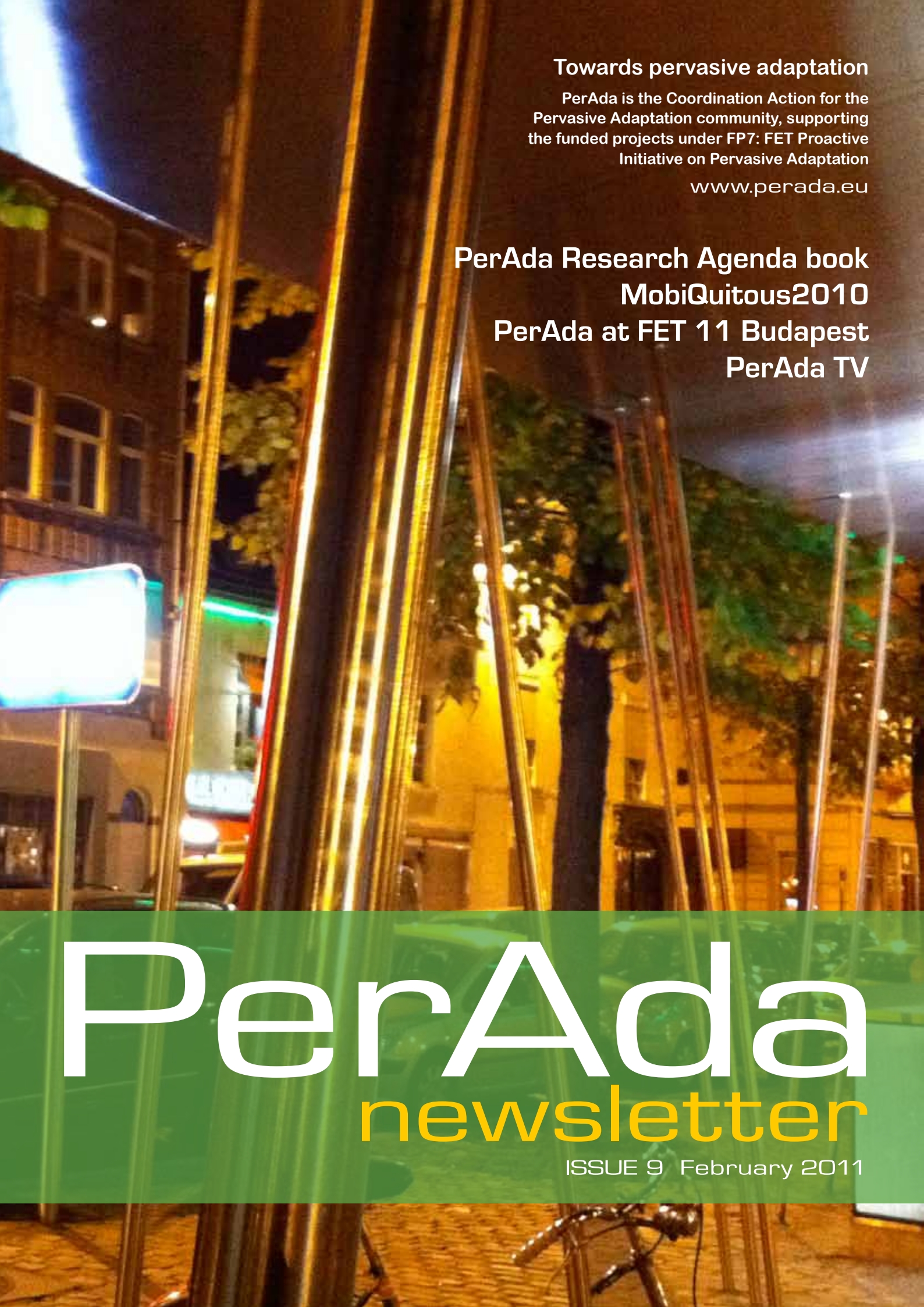


Towards pervasive adaptation

PerAda is the Coordination Action for the Pervasive Adaptation community, supporting the funded projects under FP7: FET Proactive Initiative on Pervasive Adaptation

www.perada.eu

PerAda Research Agenda book
MobiQuitous2010
PerAda at FET 11 Budapest
PerAda TV

PerAda newsletter

ISSUE 9 February 2011

Editorial

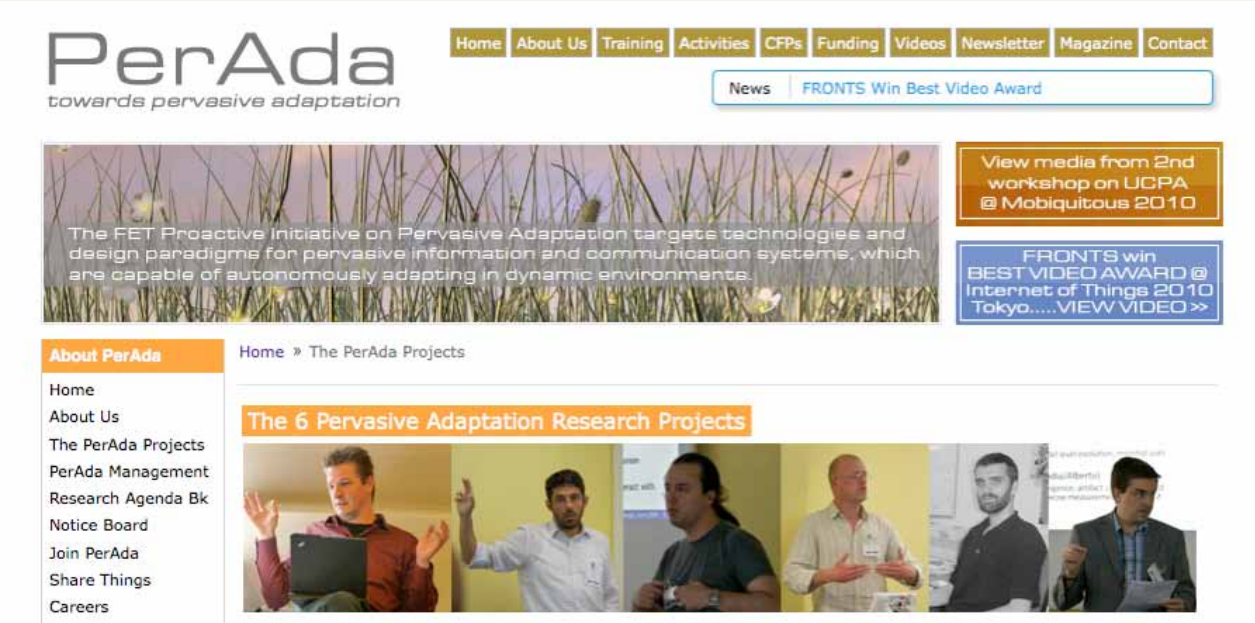
This is the penultimate PerAda newsletter, as the project draws to a close in May. However, as you can see from this issue, PerAda will be working at full speed right up to the final moments! We have a number of events to look forward to which highlight the many successes of the proactive initiative over the past three years. The most prominent event will probably be the FET 11 conference in Budapest, at which PerAda will be running three events; a networking session on *Pervasive Socio-Technical Fabric*; a live debate entitled *Heaven and hell : visions for pervasive adaptation*; and an exhibition which showcases the technologies arising out of the PerAda funded projects.

FET follows close on the heels of another major event for us – a public event to be held at the Edinburgh International Science Festival in April at which we've lined up a star cast to lead a public debate on the everyday impacts of pervasive adaptive technologies including Nikola Serbedzija, Kevin Warwick and Jenny Tillotson. As well as the debate, an interactive exhibition which raises awareness of the heaven and hell like scenarios that might arise from the use of adaptive technologies in our everyday lives will be running all week at the Science Festival.

In addition to whetting your appetite for PerAda things to come, the newsletter gives you the low down on a number of events that have taken place over the last few months, including a workshop at Mobiquitous 2010 and an inter-project workshop on Security and Trust within Pervasive Adaptative Systems. We also draw your attention to the PerAda TV channel which now contains a wide selection of videos and interviews.

See you at FET 11!

The PerAda team



PerAda TV

Did you know the PerAda website includes its own TV channel ? We now have 11 videos available for watching, including showcases of PerAda events, interviews with leading experts in the PerAda field and invited lectures.

John Howie: Sacrificing Privacy Voluntarily – The Impact to People and Business

Eitan Altman talks about evolution and the future internet

PerAda sponsored Femto Cell Workshop Istanbul 2010

Daniele Miorandi from CREATE-NET talks about his research

1st PerAda summer school, Rimini 2008

A montage from the 2nd PerAda summer school in 2009

Workshop on User-Centric Pervasive Adaptation

MobiQuitous 2010

Nikola Serbedzija (Fraunhofer FIRST, Germany), Martin Wirsing |(LMU Munich, Germany) and Alois Ferscha (Johannes Kepler Universität Linz, Austria) recently chaired a PerAda workshop at Mobiquitous2010, held in the beautiful city of Sydney from December 7th-9th 2010.

The workshop organisers told us:

"We are currently standing on the brink of a new era of computing systems: moving on from desktop computers, computing intelligence will be woven into the "fabric of everyday life", seamlessly and almost invisibly pervading our environment and delivering services adapted to ourselves and our context of use. One of the key aspects of such user-centric pervasive-adaptive systems is their ability to sense and react to the user's personal experience. Different aspects are taken into account: emotional state, cognitive engagement, physical conditions and social situation. The combination of these characteristics together with recognizable human behavioural patterns forms the personal awareness of the system. Additionally, information about the surroundings is gathered and used to establish environmental awareness. Considering such a setting, the overall goal of user-centric pervasive adaptation is to create systems that are able to derive, suggest and perform actions to optimize user comfort and performance, assisting people in their specific activities and situations. That implies systems tailored to the specific user, everywhere, always available, seamless and responsive to the situation in real time and life."

The workshop addressed mechanisms for realizing empathic user-centric pervasive adaptation, recognising that research in different disciplines such as psychology and computer science is required to achieve these goals. With this in mind, the workshop provided a cross-disciplinary forum for participants to exchange ideas about a wide range of topics related to pervasive adaptation and contextual/personal awareness, covering theoretical aspects as well as practical methods, concrete applications, system architectures and use cases. Special attention was paid to privacy, in particular examining software solutions to creating safe clouds of personal data which can be used for local control and still remain invisible to the outside world.

Nine technical papers were presented at the workshop. Additionally, presentations of each of the talks are now available for download from the PerAda website: **www.perada.eu**.

Through the lifetime of the initiative, PerAda have been collating the Research Agenda Book - a book with a comprehensive collection of short articles discussing the latest ideas in Pervasive Adaptation. The goal of the Research Agenda is to provide a systematic ordering of terms and a more standard and agreed explanation of the various research fields in order that future research in PerAda is integrated, coordinated and informed. Leading scientists, heads of industry and PerAda experts have all been invited to contribute to the book which will ultimately be published in printed format.

The book now has 65 high quality articles which can be viewed from the PerAda website, either in electronic form or by downloading a printable pdf.

Research Agenda Book

Targeting 100!

We would like to reach a target of 100 articles by the end of the project – at this point, the articles will be reviewed by a team of word-leading experts in the field and consolidated into a single volume.

This is your chance to help define the research agenda in Pervasive Adaptive Systems – log onto the website and add your article before it's too late! Articles have been organised into nine chapters under the headings:

Autonomous Adaptation
Adaptive Pervasive Ensembles
Emergence and Evolvability
Societies of Artefacts
Dependable Pervasive Systems
Pervasive Trust
Human-Centric Adaptation
Socio-Technical Systems
Quality of Life

Wordle clouds generated from the text in the articles contained in the Autonomous Adaptation chapter and the Societies of Artefacts chapter

PerAda Goes to FET 2011!

The end of the PerAda initiative will not go un-noticed as PerAda hosts three separate events during the FET 11 Conference in Budapest in May, a fitting end to a very productive three and a half years of work by all involved. www.fet11.eu

Pervasive Socio-Technical Fabric

Friday 6th May, 10:45

Prof Alois Ferscha

University of Linz, Dept. of Pervasive Computing, Linz, Austria

In 2011, now 20 years after M. Weiser's "The Computer for the 21st Century" (1991), the vision impacting the evolution of Pervasive Systems is still the claim for an intuitive, unobtrusive and distraction free interaction with large scale, technology-rich environments. In an attempt of bringing interaction "back to the real world" after keyboard and screen interaction (personal computing), computers are being understood as embedded and operating in the background. Quoting from Weiser's (1991) vision "The most profound technologies are those that disappear. They weave themselves into the fabric of every day life, until they are indistinguishable from it." This session will reflect, and look forward to the next grand challenge in Pervasive Systems research: Pervasive Socio-Technical Fabric. It poses challenges both in the technological, as well as in the societal dimension.

One aim of the session is to present the prospective Research Agenda for Pervasive Adaptation, developed within the FP7 FETproactive project PANORAMA (Pervasive Adaptation Network for the Organisation of the Research Agenda and the Management of Activities, FP7 ICT Call-2, FET proactive / Goal 8.3: Pervasive Adaptation) as an umbrella of the related projects SYMBRION, SOCIALNETS, FRONTS, ALLOW, REFLECT and ATRACO. Within PANORAMA, a totally new, web based approach of soliciting frontier research challenges has been followed, collecting about 100 research issues and challenges from the most distinguished, outstanding European researchers, but also from the whole worldwide scientific community, as well as from industrial stakeholders. The result is the Pervasive Adaptation Research Agenda Book (www.perada.eu/research), to be presented, reflected, discussed and negotiated during this session.

The networking session will take the form of a live debate, primed by short talks by four distinguished leading experts in the field who will each outline research challenges towards Socio-technical Pervasive Fabric from their own background.

Dr Norbert Streitz

Pioneer in Generation 1 - Connected

(Head of the FETproactive "Disappearing Computer" Initiative, 2001, funding 400 M€, 17 Projects)

Prof Anind K. Dey

Pioneer in Generation 2 – Aware

(Father of "Context", implementor of first Context Computing Framework, now CMU)

Prof Nigel Davies

Pioneer in Generation 3 – Smart

(Editor in Chief, IEEE Pervasive Computing, CS at Lancaster University)

Prof Ferscha Pervasive Socio-technical Fabric

(The PANORAMA Research Agenda Book – 100 voices from Science and Industry)

Heaven and hell : visions for pervasive adaptation

Thursday 5th May, 11:00

With everyday objects becoming increasingly smart and the "info-sphere" being enriched with nano-sensors and networked to computationally-enabled devices and services, the way we interact with our environment has changed significantly, and will continue to change rapidly in the next few years.

This session considers some implications for the future, inviting participants to evaluate alternative utopian/dystopian visions of pervasive adaptive technologies. It will appeal to anyone interested in the personal, social, economic and political impacts of pervasive, ubiquitous and adaptive computing.

This Pervasive Day

The session is based on themes from the PerAda book entitled "This Pervasive Day", to be published in 2011 by Imperial College Press, and will include several authors from the PerAda projects, who are technology experts in artificial intelligence, adaptive systems, ambient environments, pervasive computing. The book offers visions of "user heaven" and "user hell", describing technological benefits and useful applications of pervasive adaptation, but also potential threats of technology. For example, positive advances in sensor networks, affective computing and the ability to improve user-behaviour modeling using predictive analytics could be offset by results that ensure that neither our behaviour, nor our preferences, nor even our feelings will be exempt from being sensed, digitised, stored, shared, and even sold. Other potentially undesirable outcomes to privacy, basic freedoms (of expression, representation, demonstration etc), and even human rights could emerge. One of the major challenges, therefore is how to improve the pervasive technology (still in its immature phase) in order to optimise benefits and reduce the risks of negative effects.

Debate

The session will take the form of a debate, primed by several short "starter" talks by several *This Pervasive Day* authors who will each outline a "heaven and hell" scenario. A short interactive video documentary will present some particular questions, allowing the audience to vote and provide feedback on the social impact expected for these technologies. Audience reaction will be presented in animated graphical visualisations on a screen and a series of these visualisations will be saved at the end of the session and made available on the PerAda coordination action website for future reference.

Speakers

The session will be chaired by **Ben Paechter,** Edinburgh Napier University, and coordinator of the PerAda coordination action.

Jeremy Pitt, Imperial College London, UK, editor of This Pervasive Day

Katina Michael, University of Wollongong, Australia, discussing RFID Implantable Devices for Humans and the Risk-versus-Reward Debate

Nikola Serbedzija, Fraunhofer FIRST, Germany, asking "Who is more adaptive: the technology or ourselves? If we do not make the technology adaptive to us, we are in danger of human mutation!"

PerAda Exhibition
Pervasive Adaptation: it's here!

The six PerAda funded research projects are nearing completion and through a mixture of video and interactive displays some key research concepts will be displayed at the FET11 exhibition area.

The exhibition has been organized by the PerAda Coordination Action supporting the six PerAda research projects including:

The ALLOW project (www.allow-project.eu) has been developing a new programming paradigm for pervasive applications interacting with, and adapting, to human behaviours and changing environments. A visionary concept of context-aware work flow processes has been developed for adaptive pervasive applications.

The ATRACO project (www.uni-ulm.de/in/atraco) is concerned with ambient intelligent pervasive environments occupied by multiple users and supporting multiple activities over changing context.

The FRONTS project (http://fronts.cti.gr) focuses on the algorithmic foundations of adaptive networks of locally-interacting small devices. Inspired by such diverse fields as economic market behaviour, biological systems and even thermodynamics and physics, two schemes have been produced: one set for the internal continuous self-organization of the network, and another set for adapting and responding to external changes dynamically.

The REFLECT project (http://reflect.pst.ifi.lmu.de) aims to develop new concepts and means for pervasive-adaptive systems, capable of sensing users and their mood and intentions. Factors like emotional state (eg annoyance), cognitive engagement (eg high mental workload) and physical conditions and actions (eg temperature and movement) along with typical human behavioural patterns form the personal awareness of the system.

The SOCIALNETS project (www.social-nets.eu/news.php) proposes new adaptive approaches to networking between wireless mobile devices including adaptive architectures to harness the behaviour, mobility and social groups of the users. The SOCIALNETS project aims to enable wireless devices to socially network with each other in order to disseminate information without the need to maintain always-on connectivity.

The SYMBRION project (www.symbrion.eu) is developing novel principles of adaptation and evolution for symbiotic multi-robot organisms based on bioinspired approaches and modern computing paradigms. Such robot organisms will consist of super-large-scale swarms of robots, which can dock with each other and symbiotically share energy and computational resources within a single artificial-life-form.

As adaptation of individual components to human preferences and situational factors increasingly leads to adaptation of systems as a whole and the emergence of new system behaviours, computer architectures now require greater understanding of the dynamic nature of human social interactions with intelligent devices, to incorporate techniques for maintaining trust & security while at the same time encouraging co-operation. In addition to several short films summarising project research, several displays and interactive games will demonstrate the concepts embodied in pervasive adaptation.

PerAda targets pervasive information and communication systems capable of autonomously adapting in dynamic environments. The following interactive games and displays will demonstrate concepts embodied in pervasive adaptation:

What lies beneath?

Entertaining face detection and augmented reality applications will demonstrate the potential of pervasive computing systems.

Fun In Numbers:

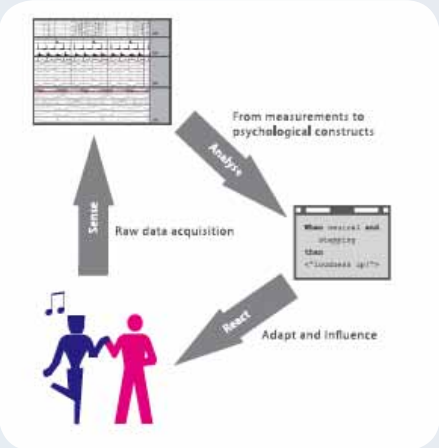
FRONT's interactive installations showing innovative methods of human-computer interaction where participants automatically interact with each other and their surrounding environment by moving and gesturing using sensor devices. FRONTS received the Best Video Award at the Internet of Things 2010 conference in Tokyo, Japan (http://www.funinnumbers.eu/),

Everyone can be Jackson Pollock:

Participate in FRONT's artistic colourthrowing, using smart colour buckets and dynamic painting creation techniques with real-time sound effects.

Mozart or Meatloaf?

The REFLECT Mood Player illustrates the use of reflect technology in building control systems naturally integrated into everyday surroundings. It features adaptive control based on understanding of user's emotions, needs, intentions and social situations, effectively demonstrating how music can influence our emotional state. Reflective systems are new generation control systems that allows for implicit, user-aware ambient control. They take into account contextual situation, users' emotional, cognitive and physical state and perform action to optimize controlled activities, improve comfort and users well being.



ALLOW showcase:

an interactive simulation that demonstrates how flow-based applications in a logistics scenario optimize criteria like energy consumption and throughput. The visualization allows visitors to manipulate key parameters to see how the flow-based logistics application adapts itself to the changed circumstances in order to display acceptable performance again.

Evolutionary robotic organisms:

SYMBRION demonstrates how single robots can become robot organisms, eg a pervasive robotic system capable of autonomous adaptation to highly dynamic and open environments. Robot organisms emerge from swarms of robots, which can dock with each other and symbiotically share energy and computational resources within a single artificial life-form.

PerAda Trust and Security Workshop

In November 2010, PerAda convened a workshop for the benefit of researchers in the PerAda projects as a cross-project event to determine key challenges in security, trust and privacy as they relate to pervasive adaptation and as guided by particular factors arising from project work. The workshop focused particularly on determining important themes in pervasive adaptation still requiring further research and in identifying ongoing challenges.

The workshop was organised by PerAda members Giuseppe Persiano, and Alberto Marchetti Spaccamela. Three invited speakers provided a framework for discussion:

Jonathan Katz, associate professor of computer science at the University of Maryland, whose research focuses on cryptography, network security, and theoretical computer science. He spoke about why security and privacy are already hard to achieve today. His talk addressed the question of whether they can ever be realized in a pervasive computing environment. While he was careful to identify challenges inherent in this setting, he also highlighted some potential opportunities for research in the area.

M. Angela Sasse, Professor of Human-Centred Technology and Head of Information Security Research in the Department of Computer Science at University College London, is a usability researcher by training. Her research focuses on developing a human-centred perspective on security, privacy, identity and trust. Her talk discussed the subject of biometrics, and the possible implications of new technologies which enable us to capture biometric data without individuals being aware of it. This has a range of implications for individuals and society, ranging from the benign to the worrying.

Katina Michael, Associate Professor at the University of Wollongong in the School of Information Systems and Technology, Australia, spoke to the workshop over a weblink. She spoke on the subject of RFID implantable devices, debating the risks and rewards for humans of this new technology. The debate was informed by primary interview source data, and pondered the potential uptake of non-medical implantables and their societal implications.

In addition, each of the **PerAda projects** provided a short presentation on the issues with security, trust and privacy they have encountered in the course of their projects. Lively discussion sessions were held on a variety of topics, ranging from risk analysis in healthcare to method for prevention of cloning of trusted artefacts. All material from the workshop including slide presentations and a podcast of Katina's talk are available from the PerAda website. The workshop was both productive and enjoyable, attended by around 35 people. Many thanks to the team from Universite di Roma La Sapienza for their hard work and effort in organising this workshop.

Edinburgh International Science Festival

April 2011

PerAda is presenting two public activities at the Edinburgh International Science Festival in April - an interactive exhibition and a discussion event. The festival is a major event, attracting around 125,000 adults and children. Both PerAda events take place at Inspace, 1 Crichton Street, Edinburgh EH8 9AB, UK.

EMOTION AS INTERFACE

The new generation of computer systems are able to understand and alter our individual emotional states. The products we use daily - our cars, clothes and music players – will soon incorporate intelligent technologies that can adapt our environments according to our moods. Join a panel of experts; Prof Kevin Warwick, Dr Jenny Tillotson and Prof Nikola Serbedzija, working at the forefront of this research to debate the benefits, and possible dangers, this technology offers.

6pm • 1 hour talk followed by drinks (ticket price includes entry to This Pervasive Day exhibition and a glass of wine)

THIS PERVASIVE DAY

Soon, wearable technology will mean that everyday items we carry on our bodies – phones, pagers and laptops – will be able to sense and alter our moods and make changes to our environments, with or without our knowledge. This interactive exhibition explores the exciting possibilities and potential dangers. 9-19 April (12noon-8pm) • Free

More details, including ticket information and the full programme of festival events is available at: www.sciencefestival.co.uk

photos: Edinburgh International Science Festival

Foire de Lyon

PerAda is planning several public outreach events to take place before the end of the project later this year. One of these is participation in the Foire De Lyon; a major international trade fair in France. This is open to the public and will include a showcase of inventions using pervasive and adaptive technologies.

All of these events will promote the work of the PerAda projects to a general public audience in an engaging and exciting manner. They are also being designed to elicit public opinions on the potential impacts of pervasive and adaptive technologies. Watch out for more details on the PerAda website

www.foiredelyon.com

PerAda Projects

ALLOW
Adaptable Pervasive Flows www.allow-project.eu

ATRACO
Adaptive and Trusted Ambient Ecologies www.uni-ulm.de/in/atraco

FRONTS
Foundations of Adaptive Networked Societies of Tiny Artefacts fronts.cti.gr

REFLECT
Responsive Flexible Collaborating Ambient reflect.pst.ifi.lmu.de

SOCIALNETS
Social Networking for Pervasive Adaptation www.social-nets.eu

SYMBRION
Symbiotic Evolutionary Robot Organisms www.symbrion.eu

About PerAda

The FET Proactive Initiative on Pervasive Adaptation targets technologies and design paradigms for pervasive information and communication systems, which are capable of autonomously adapting in dynamic environments. The adaptation of individual components will lead to adaptation of the system as a whole and to the emergence of new system behaviours which will be self-configuring, self-healing, self-optimizing and self-protecting.

PerAda is the Pervasive Adaptation Research Network, coordinated by Edinburgh Napier University, Edinburgh, Scotland - which aims to bring researchers together to discuss and share ideas relevant to Pervasive Adaptation. By joining the discussion, PerAda members gain access to a comprehensive research network to share ideas and resources.

www.perada.eu

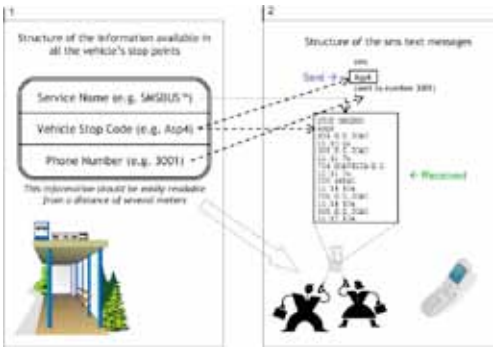
PerAda magazine

Check out the latest articles in the PerAda magazine:

Real-time bus-travel data uses mobile-device text messages

João Falcão e Cunha

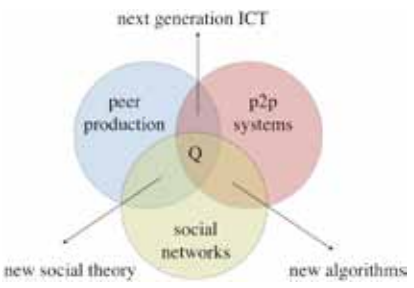
A new information service that provides accurate estimates of bus-stop arrival times uses expertise in computer science, statistics, forecasting and marketing.



The socio-economics of peer-to-peer systems

David Hales

Peer-to-peer systems, social networks and new economic models offer the possibility of radically decentralized approaches applicable to media, science and finance.



The magazine has articles listed under the following categories: Affective Computing, Agents, Artefacts, Autonomic Systems, Citizenship, Devices, Human Computer Interaction, Middleware, Mobile Applications, Privacy & Security, Sensor Networks, Social Networks, Software.

Read all the PerAda magazine articles online or download: www.perada-magazine.eu