
	<p>PEPITO IST-2001-33234 PEer-toPeer Implementation and TheOry</p>
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D 6.4 Dissemination and Use Plan
Covering period 1.1.2002-31.12.2004

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Partners: SICS, KTH, UCAM, INRIA, UCL, EPFL

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THE FIFTH FRAMEWORK PROGRAMME

The Fifth Framework Programme focuses on Community activities in the field of research, technological development and demonstration (RTD) for the period 1998 to 2002.

Deliverable 6.4 Dissemination and Use Plan

Part 1: Overview

1.1 Overview of the expected results

1. Formal models for peer-to-peer computing (publications)
2. Distributed algorithms for peer-to-peer computing realizing a scalable and robust name/directory service based on these algorithms (publications)
3. Language-independent distribution subsystem for peer-to-peer computing (open-source software)
4. Languages and platforms for peer-to-peer computing (open-source software)
5. Demonstrator applications (open-source software)

All results are available at the end of the project. All are intended for use *and* dissemination.

1.2 Approach to Dissemination and Use

We will

- publish papers in internationally recognised refereed conferences and journals, and talks in project and cluster workshops.
- make code freely available on the web.
- create and maintain a Web site with presentations, project reports, publications, and related matters, informing scientific and industrial communities of the project progress (see below).
- explore potential applications of the project results in Internet applications.

1.3 Market Projections

Future markets targeted by the PEPITO project

What is Peer-to-Peer?

In peer-to-peer computing the net is symmetric. There are no clients, servers, caches, routers, only peers.

P2P advantages

Peer-to-peer computing offers instant capabilities for massive parallelism since it scales to all nodes connected to the Internet, that is, any device connected to the internet could eventually be used. You can share your computer with others when you are not using it, thus making better use of existing computers without buying new ones. Peer-to-peer computing is highly fault-tolerant. The

functionality of a peer-to-peer network is virtually impossible to stop, since there is no central point of control.

P2P Applications

There is a small but rapidly growing class of applications that can be classified as peer-to-peer. Up to now, these applications have been primarily intended for brokering and exchanging resources between peers. Some, like ICQ, Napster, and SETI@home, still use centralized coordination to mediate services. Others, like FreeNet and Gnutella, no longer require central control. Because of the continued exponential growth of the Internet, we postulate that future peer-to-peer applications will become much more important and will cover a much wider spectrum of user needs. Here are some examples:

- Media sharing (newspapers, magazines, music, films, radio, TV, concerts, lectures)
- People-to-people computing (messaging, chat, personal radio and TV channels, ...)
- Collaborative tools for corporate use (work any-place, any-time)
- Virtual supercomputers
- Collaborative computing (SETI, crypto analysis, medical research, molecule folding, find drugs to treat cancer, Alzheimer's disease)
- Backup (store your critical data on other machines)
- Sell or give away time on your computer

P2P Predictions

Today – corporate media control

2006 – Individual media (be your own media provider with P2P)

Today – Internet is asymmetric, more information consumers than producers

2006 – Internet is symmetric, with potentially as many producers as consumers

Today – P2P for private use (Gnutella, ...) small corporate use (Groove, www.groove.net)

2004 – Enterprise P2P emerges

2006 – Corporate IT infrastructure changes to P2P techniques, Backup, intranet messaging, mail provided by P2P applications

2007 – P2P market worth \$3.54B (Frost and Sullivan)

Today – Separation between telecom and internet services (for example SMS and ICQ are separate)

2006 – Merging of telecom and internet services. SMS, MMS etc. are replaced by free Internet services. ICQ etc. are replaced by ad hoc P2P groups. Mobile devices provide IP connectivity – most services are provided by the net

Financing P2P

The job of financing the information society lies chiefly with the private sector. The support for services developed within this project will encourage both market push and market demand. This will in turn make the potential for

profitable development very clear to investors. The effect will be that the rapid development we hope for will almost entirely be financed by the private sector. The process will be similar of that of the WWW of today: a relatively small initial investment is followed by massive investment from a large number of private investors.

Large corporations versus smaller

An advantage of the P2P approach to the situation of today is that in P2P nets there is no immediate advantage for one large company supplying an integrated set of services. Rather, users may prefer to use integrated services from small suppliers, since such services could more readily adapt to changes, detect opportunities for new services and supply solutions.

Changing Rôles in Society

The move from the industrial society into the post-industrial information society requires large changes in the work patterns and nature of employment models for people. By supporting the development of services as we do, we contribute to the shaping of this culture. Our focus on highly distributed and heterogeneous solutions makes it possible for virtually anyone to become a service provider. This approach will contribute to social goals such as promoting equal opportunities between men and women, help young unemployed persons to enter the labour market, and foster the creation of new jobs.

How we approach the challenges

P2P research questions

- How do we scale to every node in the internet?
- How do we store data forever?
- How do we find things?
- How do we make the system totally secure?
- How do we ensure anonymity, censorship-resistance?
- How do we ensure accountability?

Programming platforms

Design prototypes of programming platforms (middleware) suitable for peer-to-peer computing are lacking today, e.g. CORBA and .Net services are all server-centric and depend on fixed IP addresses. Even SOAP, a recent protocol whose goal is to allow RMI with XML, is server-centric. By integrating our algorithms into freely-available programming platforms Oz, Jocaml and Java/DACE/Scala we intend to make a significant contribution to the realization of the P2P-technology.

Part 2: Description of Dissemination Plan

2.1 Conferences

- PEPITO workshops, one per year, open to visitors but mainly partners. Information on the first two including most presentations given is available at <http://www.sics.se/pepito>

We have already contributed to the following conferences and workshops (see publication list below):

- FMOODS 2002, ESOP 2002, AMAST 2002, European Conference on Object-Oriented Programming (ECOOP), Privacy Enhancing Technologies (PET 2002), First International Workshop on Task Models and Diagrams for User Interface Design (TAMODIA 2002), Bucharest Romania, July 2002. 1st International Workshop on Peer-to-Peer Systems (IPTPS'02). The Second IEEE International Conference on Peer-to-Peer Computing Use of Computers at the Edge of Networks (P2P2002), Linköping Sweden, September 2002. SRDS 2002 (Symposium on Reliable and Distributed Systems), First Workshop on Hot Topics in Networks (HotNets-I).

Plans are to publish also in POPL, ICFP, CONCUR, ICALP, ETAPS, ECOOP, PODC, ICDCS, Sigcomm, a.o.

Accepted papers in conferences and workshops

1. *"Timing UDP: mechanized semantics for sockets, threads and failures". Keith Wansbrough, Michael Norrish, Peter Sewell, Andrei Serjantov. In ESOP, April 2002.*
2. *"Anonymizing Censorship Resistant Systems" (Serjantov) presents a design of a peer-to-peer censorship resistant system with strong anonymity properties. 1st International Workshop on Peer-to-Peer Systems (IPTPS'02). LNCS*
3. *"Towards an Information Theoretic Metric for Anonymity" (Serjantov, Danezis) criticises the traditional notion of anonymity set and introduces a metric which takes into account that different messages may not be equally likely to be sent/received by all the parties in the anonymity set. Privacy Enhancing Technologies (PET 2002). LNCS*
4. *"FlexClock, a Plastic Clock Written in Oz with the Qt toolkit", (Donatien Grolaux, Peter Van Roy, Jean Vanderdonckt) First International Workshop on Task Models and Diagrams for User Interface Design (TAMODIA 2002), Bucharest Romania, July 2002.*
5. *S. Baehni, P. Eugster and R. Guerraoui. "OS Support for P2P Programming: a Case for TPS." Proceedings of the 22nd International Conference on Distributed Computing Systems (ICDCS 2002) Tech. Report - February 2002 - Publication's ID:200204*
6. *S. Briais, U. Nestmann "Mobile Objects "Must" Move Safely". In: Proceedings of FMOODS 2002, pages 129-146. Kluwer Academic Publishers. March 2002.*

7. Matthias Zenger. "Type-Safe Prototype-Based Component Evolution." In *European Conference on Object-Oriented Programming (ECOOP)*, Malaga, Spain, June 2002. Springer-Verlag. LNCS. Technical report IC/2002/014.
8. J. Borgström, U. Nestmann. "On Bisimulations for the Spi Calculus." Accepted (April 2002) for publication in the *Proceedings of AMAST 2002*. Sep 2002. Springer-Verlag. LNCS. (This publication might become related to PEPITO-topics depending on how far security issues will be integrated later on.)
9. "NetProber: a component for enhancing efficiency of overlay networks in P2P systems", (Luc Onana Alima, Valentin Mesaros, Peter Van Roy, and Seif Haridi). Accepted at the *Second IEEE International Conference on Peer-to-Peer Computing Use of Computers at the Edge of Networks (P2P2002)*, Linköping Sweden, September 2002.

Submitted

1. "A Framework for P2P lookup services based on k-ary search". El-Ansary S., Onana L., Brand P., Haridi S. submitted for publication to *SRDS 2002 (Symposium on Reliable and Distributed Systems)*.
2. "On the composition of P2P data location algorithms". El-Ansary S., Onana L., Haridi S., Brand P., submitted for publication to *First Workshop on Hot Topics in Networks (HotNets-I)* www.acm.org/sigcomm/HotNets-I.

2.2 Publications

Intended journals

ToPLaS, I&C, TCS, SCP, DC, a.o.

1. A. Schmitt and J.-B. Stefani. "The M-calculus: a Higher-Order Distributed Process Calculus". *INRIA Technical Report RR-4361*. 2002.
2. "Design and implementation of calculi for mobile agents". A. Schmitt, Ph.D. thesis (submitted). 2002.

2.3 Web presence

<http://www.sics.se/pepito> is maintained by the project administrative coordinator Thomas Sjöland of SICS. All deliverables will be made available on this web page and stored at SICS. For each work package (except the managerial one) a web tree is maintained at the site of the responsible partner (UCAM for WP1, KTH for WP2, EPFL for WP3, SICS for WP4, UCL for WP5) Pointers to these pages are also at the central page. The work package web pages will monitor results of the project and highlight information that is specific to the work package.

2.4 Clustering and standardization

Those IST FET projects with which PEPITO mainly will cluster are DEGAS, MyThS, PROFUNDIS, and SECURE. For instance EPFL, INRIA and UCAM are part of the Expression of Interest for a Network of excellence on the "Foundations of Global Computing", initiated by Mogens Nielson and Vladimiro Sassone (MYTHS). A number of FET-GC projects find themselves reunited within this initiative, naturally giving rise to Cluster activities.

EPFL also considers the possibility of organizing either a Cluster event, possibly joining sites from the proposed network of excellence, or an open PEPITO event for 2004, to take place in the ETHZ-funded "Centro Stefano Franscini (CSF)" at Monte Verita in Switzerland. Preparations need to start very early, with deadline 2002.10.31 for applications.

SICS and KTH cooperate directly with nationally funded (funding agencies VINNOVA and VR) SICS and KTH projects on P2P-computing.

2.5 Other

Events and dissemination

On July 8, the Global Computing Centre at EPFL (<http://globalcomputing.epfl.ch/>), of which the local PEPITO-partners form a third of the faculty, organizes this year's "Research Day" on the theme "Global Computing". (<http://icwww.epfl.ch/events/researchday/index.jsp>)

Among prominent invited speakers from abroad, also Guerraoui, Nestmann and Odersky will give presentations. Expected audience amounts to 400 participants from research and industry.

SICS has announced the starting of the project to a Swedish audience, for instance in <http://www.sics.se/research/article.php?newsid=180>

A case of transfer of PEPITO knowledge to higher education from UCL:

There were two final-year engineering projects that were done in collaboration with PEPITO. These are projects done by students in order to get their engineering degree at UCL.

"Some experiments with peer-to-peer computing for collaborative applications", Bruno Carton and Briec Florent, final-year engineering project (advisor Peter Van Roy), Dept. of Computing Science and Engineering, UCL, June 2002.

"La fontaine de jouvence, ou la construction de l'immortalité" (Constructing immortal applications), Pablo Martinez Balsa, final-year engineering project (advisor Peter Van Roy), Dept. of Computing Science and Engineering, UCL, June 2002.

Part 3: Description of Use Plan

All results are available at the end of the project. All are intended for use *and* dissemination. The project is a research project, thus no explicit exploitation plans are present.

WP1: Formal models for peer-to-peer computing

Brief description of the result, including a self-descriptive title, innovative nature compared to the state of the art, and potential applications.

(publications)

Possible future market impact of the result, including time frame, potential “buyers”, or ultimate end users.

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Approach for promoting the use of the result, including:

- intention to protect the Intellectual Property (see form in Appendix 7)
- steps that need to be taken in the participants’ organisations to ensure exploitation
- intention to set-up/spin-off new companies.

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WP2: Distributed algorithms for peer-to-peer computing realizing a scalable and robust name/directory service based on these algorithms

Brief description of the result, including a self-descriptive title, innovative nature compared to the state of the art, and potential applications.

(publications)

Possible future market impact of the result, including time frame, potential “buyers”, or ultimate end users.

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Approach for promoting the use of the result, including:

- intention to protect the Intellectual Property (see form in Appendix 7)
- steps that need to be taken in the participants’ organisations to ensure exploitation
- intention to set-up/spin-off new companies.

Integration in the work on software platforms Oz, Jocaml and Java/DACE/Scala.

WP3: Languages and platforms for peer-to-peer computing

Brief description of the result, including a self-descriptive title, innovative nature compared to the state of the art, and potential applications.

(open-source software)

Possible future market impact of the result, including time frame, potential “buyers”, or ultimate end users.

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Approach for promoting the use of the result, including:
- intention to protect the Intellectual Property (see form in Appendix 7)
- steps that need to be taken in the participants’ organisations to ensure exploitation
- intention to set-up/spin-off new companies.

Free distribution of the software platforms Oz, Jocaml and Java/DACE/Scala.

WP4: Language-independent distribution subsystem for peer-to-peer computing

Brief description of the result, including a self-descriptive title, innovative nature compared to the state of the art, and potential applications.

(open-source software)

Possible future market impact of the result, including time frame, potential “buyers”, or ultimate end users.

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Approach for promoting the use of the result, including:
- intention to protect the Intellectual Property (see form in Appendix 7)
- steps that need to be taken in the participants’ organisations to ensure exploitation
- intention to set-up/spin-off new companies.

Use in the software platforms Oz, Jocaml and Java/DACE/Scala.

WP5: Demonstrator applications

Brief description of the result, including a self-descriptive title, innovative nature compared to the state of the art, and potential applications.

(open-source software)

Possible future market impact of the result, including time frame, potential “buyers”, or ultimate end users.

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Approach for promoting the use of the result, including:

- intention to protect the Intellectual Property (see form in Appendix 7)
- steps that need to be taken in the participants’ organisations to ensure exploitation
- intention to set-up/spin-off new companies.

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