PSIRP
Publish-Subscribe Internet Routing Paradigm
FP7-INFSO-IST-216173

DELIVERABLE D5.3

Dissemination Report

Title of Contract	Publish-Subscribe Internet Routing Paradigm
Acronym	PSIRP
Contract Number	FP7-INFSO-IST 216173
Start date of the project	1.1.2008
Duration	30 months, until 30.6.2010
Document Title:	Dissemination Report
Date of preparation	29.09.2008
Authors	Hannu Flinck (NSNF) (ed.), Pekka Nikander (LMF), Dirk Trossen (BT), Mikko Särelä (LMF)
Responsible of the deliverable	Hannu Flinck Phone: +358504839522 Email: hannu.flinck@nsn.com
Reviewed by	George Polyzos (AUEB), Petri Jokela (LMF)
Target Dissemination Level:	Public
Status of the Document:	Completed
Version	1.0
Document location	http://www.psirp.org/deliverables/
Project web site	http://www.psirp.org/

Table of Contents

Executive summary

The paradigm shift from the current endpoint-centric Internet to the pub/sub based information centric architecture investigated by the PSIRP project requires wide and efficient engagement with the key stakeholders of the industry and academia. During the first 10 project months the focus has been mainly on creating a solid foundation and an architectural frame for the basis of further refinement and detailed development. This document lists the dissemination activities during this early phase of the project.

1 Introduction

The PSIRP project [7] aims for a paradigm shift of the Internet at an architectural level, moving from dedicated endpoints to information as the core element of the architecture. Due to this fundamental paradigm shift, a closed and early feedback loop between the project and leading industry experts as well as academic researchers is crucial in order to ensure the relevance of the work. Dissemination of the architectural choices, implementation trade offs and design principles are beneficial in the larger context of architecting networks and developing system design..

This document lists the dissemination activities of the project during its first 10 months including engagement with European and international initiatives, collaboration with other national and EU projects as well as the list of publications and presentations given so far.

The dissemination plan of the project is provided in D5.2 [8] which gives an outline of our current and planned dissemination activities.

2 IST concentration and consultation

The project had representation in the following FP7 concertation and consultation meetings:

Brussels	11.-12.3.2008	Arto Karila, Pekka Nikander Sasu Tarkomaa	FI Concertation meeting
Bled	31.3.2008	Arto Karila Dirk Trossen Pekka Nokander	FI Consultation meeting

A project presentation [7] was given both in the Network of the Future concertation meeting in Brussels, 11-12.3.2008 and in the Future of the Internet Meeting in Bled, 30.3-2.4.2008 by Arto Karila (TKK-HIIT). In addition, Pekka Nikander co-chaired the Socio-Economics panel (FISE) in the Future of the Internet Meeting. Furthermore, Dirk Trossen presented requirements for future experimental facilities in the FIRE session during the Bled event.

3 Engagements with other initiatives

3.1 Future Internet Assembly (FIA)

Initial contacts to the Future Internet Assembly were made during the Future Internet Conference in Bled (31.03.2008, Slovenia) where the project was presented by the co-ordinator. The Future Internet Assembly is shaping up as a major concertation event outside the normal ICT summit series. PSIRP is committed to contribute to appropriate dissemination material into the initiative as it develops. Most likely candidates for material are the PSIRP vision, candidate architectures and demonstrators.

Pekka Nikander from PSIRP is co-chair/caretaker of the FIA Socio-Economics session.

3.2 EIFFEL

The EIFFEL think-tank is a body of invited experts, discussing the need for change towards the Future Internet in a series of events to be organized by the EIFFEL support action (SA). Three partners in the PSIRP project are also partners in the EIFFEL SA, namely Prof. P. Mahonen, Prof. G. Polyzos and Dr. Dirk Trossen.

The role as a partner in EIFFEL is limited to being a caretaker so that direct dissemination of PSIRP results into EIFFEL is not foreseen. However, many of the invited experts to the EIFFEL think tank are closely related to the work in PSIRP, such as Karen Sollins, David Clark (see more in section 5.2) and Jon Crowcroft. Through these relations, PSIRP visions and ideas are likely to find entry in EIFFEL discussions.

For the first EIFFEL TT meeting at the end of September, Dirk Trossen was invited to present thoughts and visions on future agile networks, presenting the PSIRP proposition of a large-scale publish-subscribe information-centric network as a hypothesis to provide a solution for the overall presented vision of tussle networking.

3.3 FIRE

Due to the experimentally-driven approach that PSIRP is applying in its solution development, the FIRE (Future Internet Research and Experimentation) initiative is seen as being relevant for dissemination within the European Future Internet initiatives. Early contacts have been made through invitations to project members to participate in FIRE expert group meetings.

Currently, Dirk Trossen (BT) is a member of the FIRE expert group. The project level contacts to the FIRE initiative are through Onelab2 (see section 4.5).

4 Engagement with Individual European Projects

Given the collaborative nature of the EU framework programmes and many national funding programmes, it is only natural that PSIRP results are disseminated towards other EU and nationally funded projects.

4.1 PSIRP-CHIANTI-REDI-DISTANCE workshop

A half day workshop between the PSIRP, CHIANTI, REDI, and DISTANCE projects took place on Friday the 23rd of May with 15 persons attending. See below for summaries the involved projects.

In the workshop the following specific topics were identified as common interests between the involved projects:

1. Content delivery mechanisms.
2. How to make applications and application protocols work in challenged environments.
3. How to move application protocols to DTN-based (and perhaps PSIRP-based) asynchronous communication platforms.
4. Opportunistic content sharing, storage, and retrieval.

The following actions were agreed in the workshop

1. PSIRP will provide the lower layers and possibly also the upper layers implementation to the other three projects, with the intention of the projects porting some of their applications onto the PSIRP stack. One potential target would be to work towards a common API that would allow both DTN and PSIRP/RTFM to be used as alternatives.

2. A joint security group will be formed. This group will arrange a joint security workshop some time in the fall, preferably co-located with some other workshop so that many people form both sides could participate.

3. A joint workshop on resource control and lateral error correction, with special focus on using micro-economics for understanding these will be arranged.

4. Jörg Ott from the CHIANTI project will arrange a joint workshop on the cross-area of routing and caching in the Sept.-Oct. time-frame.During the PSIRP project workshop in Helsinki from September 1st to 3rd, Jörg Ott and members of his team attended some of the sessions during the first and second day (implementation and architecture discussions) in order to deepen the relationship.

Summaries of the Projects:

The CHIANTI project (FP7-ICT-2007-1/ 216714) aims for improving the experience of mobile users by hiding lower layer disruptions from the application layer (and therefore provide a seemingly seamless operation to the end user). The project develops prototype implementations of user devices and infrastructure components as well as service platforms and middleware. It will study how the applications should be written so that they would genuinely work in an environment with lots of short-term (seconds...minutes) connectivity fluctuations. For this, the CHANTI project seeks collaboration, among others, in defining requirements for longer-term Future Internet protocol development.

The REDI project is funded by a grant from Teknologiateollisuus ry in Finland and hosted by the Helsinki University of Technology (Prof. Jörg Ott). The project is adapting and enhancing application protocol design to (a) support delay-/disconnection-tolerant operation to increase robustness and better support mobility and (b) to make application protocols aware of underlying networking characteristics so that they can take sensible decisions about their mode of operation and communication.

DISTANCE is funded by the Academy of Finland and hosted by the Helsinki University of Technology (Prof. Jörg Ott). The project develops generic support for application-specific functions in intermediate nodes in Delay-Tolerant Networking (DTN) environments. Concrete examples include the distributed storage and retrieval of content using hints from the application as well as opportunistic support for application-specific routing and forwarding policies.

4.2 N-CRAVE

The N-CRAVE project (FP7 ICT-2007-215252) exploits network coding to enhance the capacity and robustness of wireless networks. Its objectives include the development of a proof-of-concept for network coding in dynamic wireless network environments, use of network coding for the design of complexity-aware protocols for a wide range of medium access, optimization and security constraints and the development of peer-to-peer profiles and solutions that use network coding to improve application-driven performance.

In this field, PSIRP intends to investigate the possibilities and impact of network coding and caching to reduce the need for actual data traffic over the network.

To deepen the collaboration, Vasilis Sourlas (University of Thessaly. Volos, Greece) who works in the mentioned project joined the PSIRP team for this summer. He is hosted by the Nomadiclab of Ericsson (LMF). There is also a plan for a PhD student from the PSIRP project to join the N-CRAVE project in the next spring.

4.3 4WARD

The 4WARD project [4] (FP7 Project Reference: 216041) intends to design inter-operable and complementary families of network architectures through a set of radical architectural approaches. The co-existence of multiple networks on common platforms is planned through applying carrier-grade virtualization of networking resources. The utility of networks is enhanced by self-management. A new information-centric paradigm in place of the old host-centric approach is developed to improve application support. The developed solutions will embrace the full range of technologies, from fibre backbones to wireless and sensor networks.

An initial meeting between the individual experts of PSIRP and 4WARD was arranged to identify the common interests in information-centric networking. Potential collaboration topics are more specifically how information objects are accessed and identified, how information objects interact, what interaction patterns should be supported and where the corresponding functionality is placed in the network.

4.4 Trilogy

The main objectives of the Trilogy [5] (INFO-ICT-216372) project are to develop a unified control architecture for the Future Internet that can adapt to local operational and business requirements, to develop new technical solutions for key Internet control elements and assess commercial and social control aspects. Some of these objectives relate quite well to the paradigm shift towards publish-subscribe that forms the basis of PSIRP.

Informal relations have been maintained through BT in the area of congestion control and design for tussle. Common meetings between Trilogy and PSIRP to facilitate the industrial engagement have happened at BT that is participating in both projects. AUEB-RC is also participating in both projects and there are informal contacts between the groups led by Costas Courcoubetis (Trilogy) and George Polyzos (PSIRP).

4.5 Onelab2

Onelab2 (FP7 IP) continues the work of Onelab (an FP6 STREP) in the area of experimental research platforms. Onelab has been establishing the European partition of PlanetLab since 2006. Planetlab offers a global-scale Internet research platform, relevant for Future Internet research and also often seen as the basis for the US GENI efforts.

Onelab2 started in September 2008, continues the build-out of Planetlab in Europe. Furthermore, Onelab2 will be expanding into customer areas of contemporary research, large-scale publish/subscribe being one of them. PSIRP is being considered a lead customer project for Onelab2, i.e., working with Onelab2 on requirements to make Planetlab ready for the investigation of pub/sub solutions.

This “customer relationship” between the projects is seen as an important route for dissemination of PSIRP findings to the larger research community. Dirk Trossen (BT) is the leader for the data-centric networking workpackage in Onelab2 that exploits this relationship.

5 Engagement with International Initiatives, Projects and Universities

5.1 Communications Futures Program @ MIT

Two industrial partners of the PSIRP project, namely NSNF and BT, have been involved in the Communications Futures Program (CFP) [1] at MIT since its start in 2004. The consortium has involvement from MIT CSAIL, Sloan and MediaLab, i.e., three major institutions at MIT. People involved include Dave Clark, Karen Sollins, David Reed, Andy Lippman, Charlie Fine, and Bill Lehr. The work is organized in working groups, some of which are led by academia and industrial co-chairs. Each WG organizes its work according to the wishes of their contributing members, ranging from frequent phone conferences over full-day workshops to the regular plenary (usually twice a year).

The CFP consortium has proven to be a valuable stage for engagement in many areas and can therefore be used effectively for engagement with academia as well as industry. Although CFP is generally closed to members of the consortium, there are frequently invites for external partners from industry and academia to join and contribute to the discussions.

Two pieces of recent work are particularly relevant to PSIRP, namely the work within the Privacy and Security WG and the work in the Value Chain Dynamics WG. The former one is co-chaired by Dirk Trossen and is currently discussing the issue of identity in information networking see [6]. In this, a workshop is currently organized by Karen Sollins and Dirk Trossen on this topic with Pekka Nikander being invited to present findings from the PSIRP

pub/sub work in this invitation-only event alongside Van Jacobson and other highly reputed researchers.

5.2 FIND/GENI

The US NSF (National Science Foundation) programs FIND (Future Internet Design) and GENI (Global Environment for Network Innovation) are the most relevant US initiatives for PSIRP dissemination and collaboration. Many contacts exist to the Principal Investigators of these initiatives, such as through Karen Sollins and David Clark (through CFP), Scott Shenker (through ICSI and Finland) on individual basis. Recently FIND and GENI were embedded in a larger program called Network Science and Engineering due to restructuring of the US efforts.

The GENI links are largely seen through the corresponding activities in Europe, such as FIRE (on initiative level) or Onelab2 (on project level). The connection of GENI to PlanetLab makes these contacts even easier. Furthermore, the PSIRP partner BT is currently member of the GENI Wireless System WG with the possibility to directly feed into GENI views.

5.3 University of Campinas

The Department of Computer Engineering and Industrial Automation (DCA), School of Electrical and Computer Engineering, at the University of Campinas (Unicamp), is currently engaged in a co-operation with Ericsson. The work focuses on a new Internetworking architecture, based on explicitly identified data items and forwarding paths rather than communicating end-nodes. In this information-centric architectural proposal, Unicamp seeks a scalable solution to maintain the required state at forwarding nodes, in order to establish and optimize the data delivery paths. In this context, the identifiers form a flat name space. The identifier space associated to the forwarding paths present serious challenges in terms of memory size and aggregation capabilities. For example, by adopting a per-interface Bloom Filter approach as a starting point for an efficient data structure for optimized publish/subscribe based content delivery, Unicamp plans to study and design feasible solutions that aim to maintain memory and computation costs at a minimum level. The system needs to maintain and update the state at the indirection points for routing information-based messages, based on the flat identifiers of the messages themselves. Specific aspects to be considered relate to how to manage the forwarding topology and to enable a rendezvous function, forming the envisioned data-centric architecture.

While both projects, the Unicamp networking project and PSIRP, target a relatively similar information oriented networking architecture, they still have slightly different focus areas: The Unicamp project focuses on content delivery, while PSIRP aims to balance betweeninteractive communications and DNSs, both of which will require new mechanisms. Co-operation between the Unicamp's project and PSIRP has materialized via researcher exchange between Unicamp and Ericsson (LMF). Christian Esteve from Unicamp is now a visiting researcher hosted by Ericsson (LMF).

5.4 HSNLab @ BUTE

The High Speed Networks Laboratory at the Budapest University of Technology and Economics is a strategic university partner of Ericsson (ETH) and four areas of potential collaboration between PSIRP and the HSN have been identified: 1) social networking based P2P overlay systems, aligning with the goal of PSIRP devising a networking solution that takes into account social aspects for scoping information, 2) routing based on flat labels and 3) auto-configuration and self-management 4) applications that use PSIRP machinery. Initial discussions and preparations for future work items around the PSIRP API have taken place.

However, it is only meaningful to start deeper collaboration after the PSIRP architecture has progressed further, most likely early next year.

6 Other Dissemination activities

Mikko Särelä and Pekka Nikander organized a seminar on Future Internet architectures at the Technical University of Helsinki, TKK [9].

7 Journal, Conference Publications and External Presentations

The project has published the following scientific publications:

1. Mikko Särelä (LMF), Teemu Rinta-aho (LMF), Sasu Tarkoma (TKK-HIIT), *RTFM: Publish/Subscribe Internetworking Architecture*, Mobile ICT Summit 2008, June 2008, Stockholm (Sweden).
2. Nikander, Pekka (LMF), Marias, Giannis F. (AUEB-RC), *Towards Understanding Pure Publish/Subscribe Cryptographic Protocols*, Cambridge Security Protocols Workshop (SPW 2008), April 2008, Cambridge (UK).
3. Sasu Tarkoma (TKK-HIIT), Dirk Trossen (BT), Mikko Särelä (LMF). Black Boxed Rendezvous Based Networking, 3rd ACM International Workshop on Mobility in the Evolving Internet Architecture (MobiArch08), co-located with the ACM SIGCOMM conference, August 2008, Seattle (US)

The following external presentations have been given:

1. Arto Karila (TKK-HIIT), PSIRP project presentation, FP7 concertation meeting, Brussels, 11.03.2008. ~100 persons in audience.
2. Dirk Trossen (BT), From The Internet of ??? To The Future Internet, Conference on Internet of Things, 27-28.03.2008, http://www.iot2008.org. ~320 persons in audience.
3. Pekka Nikander (LMF), Socio-Economics panel, FP7 Future Internet, Bled, 1.-2.4.2008 No presentation, leading a panel Audience: ~300-400 people
4. Pekka Nikander (LMF), Security in Pub/Sub, Workshop on Security Protocols, Cambridge, GB, 16.-18.4.2008 Presentation Audience: 30-40 people
5. Pekka Nikander (LMF), Presentation about Socio-Economics, FP7 ICT FI concentration, Stockholm, 11.6.2008 Audience: 70-80 people
6. Mikko Särelä (LMF), Social Aspects of Trust in Internet: Issues and Incentives, CTTE 2008 Workshop, Paris, 18.6.2008 Presentation Audience: 20-30 people
7. Sasu Tarkoma (HIIT), PSIRP project presentation, Distributed Event-based Systems (DEBS) Conference, Rome, 3.7.2008. Poster at the demo session. ~150 persons attended the conference.
8. Dirk Trossen (BT), PSIRP project presentation, Euroview 2008 workshop, 21./22.07.08.~200 people in audience.
9. Sasu Tarkoma (HIIT), PSIRP presentation, WWRF Meeting 21, 13-15 October 2008. Stockholm. Plenary session on First results on technologies from Future Internet.

10. George C. Polyzos (AUEB-RC), Petri Mähönen (RWTH), Building the Internet of the Future – The Wireless Challenge, 15-18 September, IEEE PIMRC 2008 Conference panel session, http://www.pimrc2008.org/ Briefly presented PSIRP project views particularly from the perspective of wireless and mobile communications. ~100 persons in the audience.
11. Dirk Trossen (BT), From Design to Runtime: Tussle Networking Challenge, First EIFFEL think tank, Frankfurt, September 2008, ~30 people in the audience

The following papers have been submitted for publications:

1. Jarno Rajahalme, Mikko Särelä, Pekka Nikander, Sasu Tarkoma, Incentive-Compatible Caching and Peering in Data-Oriented Networks, Re-Arch'08, www.sigcomm.org/co-next2008/rearch.html. Submitted on Aug 26, 2008.
2. Giannis F. Marias, Nikolaos Fotiou, Dirk Trossen, Sasu Tarkoma, George C. Polyzos, Trust management for publish/subscribe networking, Re-Arch'08, www.sigcomm.org/co-next2008/rearch.html. Submitted on Aug 15, 2008.
3. Dmitrij Lagutin, Sasu Tarkoma, Hannu H. Kari., PLADO: Packet Level Authentication for Data-oriented Networks, Infocom 2009, http://www.ieee-infocom.org/, Submitted on Aug 29, 2008.
4. Petri Jokela, Pekka Nikander, Somaya Arianfar, Andras Zahemzsky (Ericsson) Christian Esteve (University of Campinas): Line speed Publish/Subscribe Inter-Networking6th USENIX Symposium on Networked Systems Design and Implementation (NSDI '09) http://www.usenix.org/event/nsdi09/

8 Project Web site

Public deliverables, a technical report and publications together with general information about the project, including the project presentation, are available in the publicly accessible project Web site

http://www.psirp.org/.

9 References

[1] http://cfp.mit.edu/

[2] "Prototype Platform and Applications Plan and Definition", PSIRP deliverable D3.1

[3] http://www.telco2.net/event/index.php

[4] http://www.4ward-project.eu/

[5] http://www.trilogy-project.org/

[6] K. Sollins, D. Trossen, “Identity in Information Networking”, Whitepaper of the Communication Futures Program, MIT, May 2008

[7] http://www.psirp.org/

[8] Dissemination and Exploitation Plan, Deliverable D5.2 , Publish-Subscribe Internet Routing Paradigm Project

[9] T-110.7190 Research Seminar on Future Internetworking, see more at http://www.tml.tkk.fi/Opinnot/T-110.7190/2008/spring/index.html