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RELEASE

A High-Level Paradigm for Reliable Large-Scale Server Software
A Specific Targeted Research Project (STReP)

D7.2 (WP 7): Dissemination and Collaboration Plan

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Purpose: To identify and outline the main methods used to disseminate results from the project to the members of the public by means of academic and commercial activities. Also to identify other Framework Programme projects with similar research areas and how RELEASE will work with them.

Results:

- We have developed, and are pursuing, a multi-strand dissemination policy.
- We are following a process for evolving the dissemination plan during the period of the project.
- We are engaging the scientific community with publications, talks, interactions with related projects etc.
- We are engaging the commercial sector with presentations at industry forums.
- We are contributing to Open Source software.

We have developed, and are pursuing, a multi-strand, evolving dissemination plan. We are engaging the public via a website, press releases, posters etc. We are engaging the scientific community with publications, talks, interactions with related projects (including a joint workshop). We are engaging the commercial sector with presentations at commercial conferences and industry forums. We are contributing to open source software, for example improving the Erlang/OTP framework with Virtual Machine upgrades, delivering improved tools, including Wrangler and Percept2, and a benchmark suite.

Project funded under the European Community Framework 7 Programme (2011-14)

Dissemination level

PU	Public		*
PP	Restricted to other programme participants	(including the Commission Services)	
RE	Restricted to a group specified by the consortium	(including the Commission Services)	
CO	Confidential only for members of the consortium	(including the Commission Services)	

Dissemination and Collaboration Plan

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1 Introduction

The project committed itself to a variety of dissemination and exploitation activities as detailed in the Description of Work. In particular we committed ourselves to a number of activities in WP7, as follows.

Work package 7 concerns innovation-related activities, principally dissemination and exploitation. Erlang Solutions Limited (ESL) leads this work package and is particularly concerned with the exploitation and industrial dissemination. University of Glasgow (GLA) coordinates the academic dissemination.

Specific parts of the project's management meetings are devoted to dissemination and exploitation. These are chaired by ESL with progress reports from the work packages that feed directly into a discussion of how they can best be disseminated within and outside the project, and how they might be exploited by project partners. The project includes the following components.

We have a dedicated *Website and Domain: www.release-project.eu* that present the project to the 'outside world', linking together the presentations of all the members' work on a single site. This is used for news announcements, event calendars, press releases, distribution of the tools, articles, tutorials and discussion forums. Within the limitations imposed by appropriate protection of IPR, all scientific results are made available via this means, and such mechanisms in other projects have shown excellent results. We detail technical advances and release non-commercially-sensitive Open Source components via the web.

We have a project internal collaborative area on *Redmine* and *Github*¹ where all collaborative products are stored and shared.

The development of the software will involve Open Source practice, and a number of the tools will be made available under Open Source licences. We will also use OS tools ourselves: for example, we are using GitHub as our repository. We routinely make releases of our various tools which are being developed in line with the Description of Work. Each release will be announced through the usual Erlang community channels, which include mailing lists, forums, blogs, twitter and Facebook.

We disseminate results via *Publications, Papers*, and associated media like videos. Particular forums of relevance include the annual *ACM SIGPLAN Erlang Workshop*, which is co-located with the ACM-sponsored *International Conference in Functional Programming (ICFP)*. Pragmatic, user-focussed, parts are presented to the annual Ericsson-sponsored Erlang User Conference, which attracts a large and expanding audience. Other relevant scientific forums include those outlined in section 3.1.

The partners will hold a *Project Workshop*, where we will invite academics and industrialists with interests in the work of the project. This will allow project members to get early, informed, disinterested feedback on the project through presenting it to the attendees, as well as allowing members of the project to hear about related developments from external attendees.

The consortium members continue to leverage their contact network requesting invitations to make presentations and present guest lectures to commercial forums and universities alike, as enumerated in Sections 3.3 and 4.2 below.

In addition, we spend time on *Community Dissemination* in order to introduce SD Erlang and the tools to the wider Erlang community through visits to conferences and workshops. Liaison by the parties involved with the Erlang community has helped foster the successful adoption of the language, tools, and concepts developed in the project, and has also allowed the project to leverage existing Open Source components where appropriate.

¹ <https://github.com/release-project/RELEASE/>

The remainder of the document is structured as follows. Section 2 outlines public engagement activities. Section 3 outlines scientific dissemination. Section 4 outlines commercial activities. Section 5 details open source software contributions. Section 6 outlines the process for maintaining the dissemination plan.

2 Public Engagement

2.1 Website

The project website (produced as a part of [Deliverable 7.1](#)⁵) is the principal public interface of the project. <http://release-project.softlab.ntua.gr/>

It includes:

- Project overview and objectives
- Project partner information
- Events and News
- Downloadable project outputs (publications, deliverables, papers and other dissemination products)
- News about related dissemination events
- There are 3 links to:
 - Project Fact Sheet (downloadable pdf for all)
 - The project wiki - accessible to project members only.
 - The project repository (Git) - accessible to project members only.

The website is updated continuously during the project. We are also putting completed deliverables which have a Public dissemination level onto the website for the general public.

The website automatically scrapes a specific directory of the repository and generates the web pages relating to the papers we have published and the dissemination activities which we have undergone.

In addition, the project currently uses an internal wiki for the partners to exchange information, including potential dissemination activities and opportunities. This wiki is currently being migrated to another platform (Github), which has facilities for maintaining a wiki system related to a repository; this will streamline the update of the project's web presence, ensuring that it remains up to date and error-free.

The creation of a mailing list for external collaboration was considered by the consortium before the start of the project, but, in the light of experience on other STREP projects, it was decided that such a list would probably attract few subscribers. Instead, the consortium preferred to concentrate efforts regarding producing material such as tutorials and talks – of which videos were taken at the Erlang Factories and Conferences (Section 4.2) – to be presented at workshops and conferences where we can point potential users to where more information can be found.

2.2 Press Reports

There have been three press releases from the beginning for the project so far – as detailed in Deliverable 7.1 – one via the Kent website:

<http://www.cs.kent.ac.uk/news/2011/MulticoreReleased/> – 2011.10.14

and the other two via ESL:

<http://www.erlang-solutions.com/press-releases/3/entry/1253> – 2011.07.26

<http://www.erlang-solutions.com/news/1/entry/1276> – 2011.11.09

In addition, there has been a follow-up article on radio-electronics.com on 2011.07.28 :

⁵ <http://www.release-project.eu/documents/D7.1.pdf>

<http://www.radio-electronics.com/news/design-principles/erlang-wins-800000-for-multi-core-computing-746>

3 Scientific activities – publications and papers

3.1 Targets

Scientific dissemination activities are often focussed around publications in conferences and learned journals. The following table shows a selection of key forums where project outputs are to be disseminated. They are grouped according to their main focus, the ones to the left being more specifically concerned with the Erlang language and functional programming, moving to parallel systems engineering conferences and journals.

<u>Erlang</u>	<u>Functional Programming</u>	<u>Parallel/Distributed Systems</u>	<u>Programming Languages</u>
Erlang Workshop	Symposium on Trends in Functional Programming (TFP)	High Performance and Embedded Architecture and Compilation (HiPEAC)	Principles of Programming Languages (POPL)
Erlang User conference	The International Conference on Functional Programming (ICFP)	Transactions on Parallel and Distributed Systems (TPDS)	Programming Language Design and Implementation (PLDI)
Erlang Factory	Symposium on Implementation and Application of Functional Languages (IFL)	Concurrency Practice and Experience (CPE)	Practical Aspects of Declarative Languages (PADL)
Erlang Factory Lite	The Alternative Programming Conference (Tech/Code Mesh)	Symposium on Principles and Practices of Parallel Programming (PPoPP)	Workshop on Partial Evaluation and Program Manipulation (PEPM)
	Higher-Order and Symbolic Computation (HOSC)		

The project will target each of these forums whenever possible during the project lifetime to maximise visibility. These forums also align with the publication profiles of a number of the partners and attract relevant researchers from all over the world. In addition, ESL often has a workshop or factory accompanying the conferences on functional programming which allows the project to easily present hands on tutorials for SD Erlang or the tools which are being developed as part of the project.

Scientific papers that the project produces are classified along the following lines:

- Invited talks
- Published papers, peer-reviewed with novel scientific content
- Published papers, overview papers and papers for general dissemination about RELEASE
- Workshops and tutorials
- Posters at conferences
- Other

Technical seminars given by members of the project at other Universities and Research Centers also act as informal dissemination opportunities.

3.2 Publications to Date

In the two years that project has been running, it has produced the following academic publications:

1. *Automated API migration in a User-Extensible Refactoring Tool for Erlang Programs*, Huiqing Li and Simon Thompson, in *Automated Software Engineering 2012*, IEEE Press, Essen, Germany 2012
2. *A Domain-Specific Language for Scripting Refactorings in Erlang*. Huiqing Li and Simon Thompson. In Juan de Lara and Andrea Zisman, editors, *15th Fundamental Approaches to Software Engineering (FASE2012)*, page 15pp, Tallinn, Estonia, March 2012. *Lecture Notes in Computer Science*. Springer.
3. *Let's Make Refactoring Tools User-extensible!*. Huiqing Li and Simon Thompson. In Peter Sommerlad, editor, *The Fifth ACM Workshop on Refactoring Tools*, pages 32-39, Rapperswil, Switzerland June 2012.
4. *RELEASE: a high-level paradigm for reliable large-scale server software* O. Boudeville, F. Cesarini, N. Chechina, K. Lundin, N. Papaspyrou, K. Sagonas, S. Thompson, P. Trinder, and U. Wiger. In draft proceedings of the *Symposium on Trends in Functional Programming*, St Andrews, UK, June 2012.
5. *On using Erlang for parallelization: Experience from parallelizing dialyzer*. S. Aronis and K. Sagonas. In draft proceedings of the *Symposium on Trends in Functional Programming*, St Andrews, UK, June 2012.
6. *The Design of Scalable Distributed Erlang*. N. Chechina, P. Trinder, A. Ghaffari, R. Green, K. Lundin, and R. Virding. In draft proceedings of the *24th Symposium on Implementation and Application of Functional Languages*, Oxford, UK, September 2012 (Submitted).
7. *A Scalability Benchmark Suite for Erlang/OTP*. S. Aronis, N. Papaspyrou, K. Roukounaki, K. Sagonas, Y. Tsiouris, I. E. Venetis. In the *Eleventh ACM SIGPLAN Erlang Workshop*, Copenhagen, Denmark, September 2012.
8. *On Preserving Term Sharing in the Erlang Virtual Machine*. N. Papaspyrou, K. Sagonas. In the *Eleventh ACM SIGPLAN Erlang Workshop*, Copenhagen, Denmark, September 2012.
9. *An LLVM Backend for Erlang*. K. Sagonas, C. Stavrakakis, Y. Tsiouris. *ErLLVM*: In the *Eleventh ACM SIGPLAN Erlang Workshop*, Copenhagen, Denmark, September 2012.
10. [*Precise Explanation of Success Typing Errors*](#). K. Sagonas, J. Silva, and S. Tamarit. In *Proceedings of the ACM SIGPLAN Workshop on Partial Evaluation and Program Manipulation*, pp. 33–42, Rome, Italy, January 2013. ACM Press.
11. [*Systematic Testing for Detecting Concurrency Errors in Erlang Programs*](#). M. Christakis, A. Gotovos, and K. Sagonas. In *Proceedings of the Sixth IEEE International Conference on Software Testing, Verification and Validation*, pp. 154–163, March 2013. IEEE Computer Society.
12. [*Multi-level Visualization of Concurrent and Distributed Computation in Erlang*](#). P. Rodgers, R. Baker, S. Thompson and H. Li. In *Visual Languages and Computing (VLC) in The 19th International Conference on Distributed Multimedia Systems (DMS 2013)*, August 2013.
13. *On the Scalability of the Erlang Term Storage*. D. Klaftenegger, K. Sagonas, and K. Winblad. In *Proceedings of the Twelfth ACM SIGPLAN Erlang Workshop*, pp. ?-??, September 2013. ACM Press.
14. *Scalable Persistent Storage for Erlang: Theory and Practice*. A. Ghaffari, N. Chechina, P. Trinder, and J. Meredith. In *Proceedings of the Twelfth ACM SIGPLAN Erlang Workshop*, September 2013, Boston, USA. ACM Press.
15. [*Multicore Profiling for Erlang Programs Using Percept2*](#). H. Li and S. Thompson. In *Proceedings of the Twelfth ACM SIGPLAN Erlang Workshop*, September 2013, Boston, USA. ACM Press.

3.3 Talks and presentations at scientific conferences

The project has generated a number of talks and presentations to do with distributed Erlang and the RELEASE project as a whole. Listed here are talks, presentations and posters in which the project has been mentioned. In addition, all the conference papers listed in the previous section were presented by the authors at the conferences themselves.

1. September 2011. Patrik Nyblom gave a talk titled: "Erlang ETS Tables and Software Transactional Memory" at the [Tenth ACM SIGPLAN Erlang Workshop](#)⁶ in Tokyo.
2. September 2011. Stavros Aronis and Konstantinos Sagonas gave a talk titled: "Typed Callbacks for More Robust Behaviours" at the [Tenth ACM SIGPLAN Erlang Workshop](#)⁵ in Tokyo.
3. November 2011. Kenneth Lundin made a short presentation about the RELEASE project at the [Erlang User Conference](#)⁷ in Stockholm.
4. January 2012. Phil Trinder and Kostis Sagonas attended the [HiPEAC 2012 Conference](#)⁸ project meeting, and Phil presented a [RELEASE poster](#)⁹.
5. April 2012. Kostis Sagonas gave a talk on "Scaling Erlang on a large number of cores" at the [HiPEAC Computing Systems week in Gothenburg](#)¹⁰.
6. June 2012. A number of project members attended the [TFP 2012 Conference](#)¹¹, and presented papers, including a [RELEASE project paper](#)¹² showing the projects progress in the first 6 months.
7. July 2012. Natalia Chechina presented the [SD Erlang Design](#)¹³ at a DSG seminar at Heriot-Watt University.
8. September 2012. Natalia Chechina presented the SD Erlang Design at the [IFL 2012 Conference](#).¹⁴
9. September 2012. Kostis Sagonas presented "[On the scalability of Erlang/OTP and its applications](#)¹⁵" at the Swedish Multicore Day in Stockholm.
10. October 2012. Roberto Aloï presented at the [workshop on Next-Generation Datacentres](#)¹⁶ conference in Brussels.
11. November 2012. Simon Thompson presented "Let's Make Refactoring Tools User-extensible!" at [Fun in the Afternoon, Brighton](#)¹⁷ and again at the Open University, Heerlen, The Netherlands on the 14th and 23rd respectively.
12. January 2013. Natalia Chechina presented the [SD Erlang Design](#)¹¹ at a DSG seminar at Heriot-Watt University and at a CS seminar at the University of Kent.
13. [Kostis Sagonas](#) presented a talk, [Systematic Testing for Detecting Concurrency Errors in Erlang Programs](#) at the [Sixth IEEE International Conference on Software Testing, Verification and Validation](#), in Luxembourg.
14. April 2013. Amir Ghaffari presented a talk, [Scaling Erlang](#)¹⁸ at the [Scottish Programming Languages Seminar](#)¹⁹ (SPLS), at the University of St Andrews.

⁶ <http://www.erlang.org/workshop/2011/>

⁷ <http://www.erlang-factory.com/conference/ErlangUserConference2011>

⁸ <http://www.hipeac.net/hipeac2012>

⁹ <https://github.com/release-project/RELEASE/blob/master/research/Posters/A%20High-Level%20Paradigm.pptx>

¹⁰ <http://www.hipeac.net/content/goeteborg-hipeac-computing-systems-week-april-2012>

¹¹ http://www-fp.cs.st-andrews.ac.uk/tifp/TFP2012/TFP_2012/Home.html

¹² <https://github.com/release-project/RELEASE/raw/master/research/Papers/TFP12/release-tfp12.pdf>

¹³ <https://github.com/release-project/RELEASE/raw/master/research/Talks/Factory%20Lite%20-%20SD%20Erlang%20Design.ppt>

¹⁴ <http://www.cs.ox.ac.uk/conferences/IFL2012/>

¹⁵ <https://www.sics.se/multicore2012/abstracts.html#On%20the%20scalability%20of%20Erlang%20OTP%20and%20its%20applications>

¹⁶ <http://cordis.europa.eu/fp7/ict/computing/documents/nextgen-dc-final.pdf>

¹⁷ <http://sneezy.cs.nott.ac.uk/fun/2012-11/>

¹⁸ <http://fs39.host.cs.st-andrews.ac.uk/hw.pdf>

15. May 2013. Phil Trinder gave a Glasgow School of Computing Science ENDS Seminar, giving an overview of RELEASE and outlining progress on WP3.
16. May 2013. Amir Ghaffari gave a talk, "[Scalable Persistent Storage for Erlang: Theory and Practice](#)"²⁰ in a Computer Science seminar at the University of Kent.
17. May 2013. Amir Ghaffari and Phil Trinder gave a Glasgow School of Computing Science cakes talks covering RELEASE and the WP3 work on Scalable Persistent Storage.
18. June 2013. Amir Ghaffari presented a poster entitled "[Scalable Persistent Storage for Erlang](#)"²⁰ at the [2013 SICSA PhD Conference](#)²¹ at the University of Stirling.

3.4 Cooperation with other projects

To date, there has been some cross-pollination of ideas, but other projects that have been identified as working in related areas are:

1. [ParaPhrase](#)²² - Parallel Patterns for Adaptive Heterogeneous Multicore Systems. Ongoing interaction between Heriot-Watt RELEASE staff and St Andrews ParaPhrase staff. Phil Trinder engaged in technical discussions with ParaPhrase project members at HiPEAC'12 (Paris). Symposium on Trends in Functional Programming, St Andrews, UK, June 2012.

The refactoring team at Kent – Dr Huiqing Li and Prof. Simon Thompson – have held discussions with ParaPhrase members from St Andrews – Dr Chris Brown and Prof. Kevin Hammond – on supporting their notions of resource-aware refactoring for Erlang, and Brown has used the Wrangler extension API/DSL to support these refactorings.

2. PROWESS – Property-based testing of Web services. We plan to use the scalable virtual framework CCL on this project to make it easier to scale the test suites when doing performance testing.
3. [ADVANCE](#)²³ - Performance Analysis to support Concurrency Engineering. Ongoing interaction between Heriot-Watt staff who participate in both ADVANCE and in RELEASE. Phil Trinder attended ADVANCE workshop at HiPEAC'12 (Paris).
4. [Teraflux](#)²⁴ - Exploiting Dataflow Parallelism in Teradevice Computing (similar paradigm) . Phil Trinder engaged in technical discussions with Teraflux project members at HiPEAC'12 (Paris), and MACDES (Birmingham).
5. [Scala](#)²⁵ - A general purpose programming language.
6. [EUROCLOUD](#)²⁶ - 3D 'Server on a chip' concept for cloud computing.
7. [IOLANES](#)²⁷ - Scalable storage for multicore architectures.
8. Various FP7 Cloud projects at the [Next-Generation Datacentres](#) conference in Brussels.

¹⁹ <http://fs39.host.cs.st-andrews.ac.uk/splsApril2013.html>

²⁰ <http://release-project.softlab.ntua.gr/documents/ScalablePersistentStorage.pdf>

²¹ <https://sites.google.com/site/sicsaconf2013/>

²² <http://www.paraphrase-ict.eu/>

²³ <http://www.ctit.utwente.nl/research/projects/international/fp7-streps/advance.doc/>

²⁴ <http://www.teraflux.eu/>

²⁵ <http://www.scala-lang.org/>

²⁶ <http://www.eurocloudserver.com/>

²⁷ <http://www.iolanes.eu/>

3.4.1 Joint RELEASE/ParaPhrase workshop

Delegates from the RELEASE and ParaPhrase projects participated in a workshop on the 14th June 2012 at TFP'12 in St Andrews, Scotland. This event identified areas of collaboration between the two projects and raised awareness of these projects to the delegates of TFP'12. There is continuing collaboration going on between the two projects in the wake of this event.

Phil Trinder presented “*RELEASE: a high-level paradigm for reliable large-scale server software*” to the attendees of the workshop. This paper has also been submitted for inclusion in the proceedings of TFP'12 (October 2012).

4 Commercial activities

4.1 Conferences

Dissemination activities based around commercial forums include the following:

- | | |
|--|--|
| 1. Commercial Users of Functional Programming (CUFP) | 2. Int. Software Dev conference (GOTO) |
| 3. Open Source Convention (OSCON) | 4. Int. Software Dev conference (QCON) |
| 5. Multi-disciplinary Developers conference (Strange Loop) | 6. Int. conference for Functional Programmers (Lambda Jam) |
| 7. Erlang Factory conferences (London, SF Bay area) | 8. Erlang User Conference (EUC Stockholm) |
| 9. Erlang Factory Lites (European cities) | 10. Alternative Programming Conference (Tech/Code Mesh) |
| | 11. Existing contacts of commercial partners |

Commercial activities can be classified along a number of different lines. For example, there are industry-oriented presentations which are analogous to academic conferences but to a different audience. Then there is exploitable knowledge and its use. Given the nature of our consortium, and our plans for industrial dissemination, some of our routes to industrial impact take place *within* the consortium as much as outside it.

This dissemination is taking place in several ways. In direct projects, certain tools and extensions of tools can be evaluated. The release of tools developed in the project is an important way of getting feedback as well as disseminate the knowledge.

The commercial activities run by ESL can be split into:

- The **Erlang User Conference** is run annually in Stockholm with up to 400 attendees. At all these events, in addition to the formal talks outlined in Section 3, people are told about project progress and challenges informally and told how to find out more.
- The **Erlang Factory** conferences are run in London and the San Francisco Bay area annually. These comprise of a one or two day conference with focused subject-specific tracks, and preceded or followed by an optional three-day "University" training courses and tutorials, not only in Erlang itself, but also in related technologies and Erlang-based systems and products.
- Since the start of the project, smaller, half or full-day, **Erlang Factory Lite** conferences have been held at many European cities: Amsterdam – Oct 2011, Brisbane, Australia – December 2011, Brussels – Feb 2012, Krakow, Poland – Mar 2012, San Francisco – Mar 2012, Zurich – April 2012, St. Andrews, Scotland – May 2012, Moscow – June 2012, Vancouver – July 2012.
- **Tech/Code Mesh** - The Alternative Programming Conference London 4/5 December 2012/2013 <http://techmeshconf.com/> <http://codemesh.io/> Tech Mesh is designed to support and promote useful non-mainstream technologies in the software industry and dedicated to users and inventors of various languages and technologies. By offering a networking platform to IT architects, software developers and project

managers it brings together different programming worlds and creates opportunities to exchange experiences and knowledge, necessary to pick the "the right tool for the job".

Erlang Solutions Ltd are working on a scalability framework called Wombat (formerly CCL) that will make the operations and maintenance of Erlang systems a lot easier from the initial deployment in the cloud or on physical hardware to the upgrade of the systems while in production. Erlang Solutions Ltd would like to extend the scalability framework to cover non-Erlang applications to present this to other verticals and technologies. This strategy is being evaluated internally at present.

The consortium has given talks and presentations in the new **Erlang Factory** events that have been organised by ESL which have a large non-academic audience, as detailed above.

4.2 Talks and presentations at commercial conferences

Here we give some examples of past and planned activities undertaken in this context. The Erlang Factory and User Conference talks are recorded by convention, video of them can be found at the appropriate address.

1. March 2012. Simon Thompson presented a paper on "Scripting Refactoring Behaviours" at the [SF Bay Erlang Factory](#)²⁸.
2. March 2012. Kostis Sagonas gave two talks: "ErLLVM" and "A Scalability Study of Erlang/OTP" at the [SF Bay Erlang Factory](#).²⁹
3. May 2012. Rickard Green and Patrik Nyblom presented "Taking a Virtual Machine Towards Many Cores" at the [Erlang User Conference in Stockholm](#).³⁰
4. June 2012. Kenneth Lundin, Ericsson, Presented the "Taking a Virtual Machine Towards Many-Cores" at the [Erlang Factory Lite in St Andrews](#).³¹
5. June 2012. Presented the [SD Erlang Design](#)³² at the [Erlang Factory Lite](#)³³
6. June 2012, GOTO conference Amsterdam, Francesco Cesarini gave the presentation on "Erlang From Behind the Trenches"
7. October 2012. GOTO conference, Aarhus. Torben Hoffmann gave a talk on "Erlang still evolves for multi-core and cloud environments."
8. November 2012. Simon Thompson presented "[Profiling Erlang programs using Percept2](#)"³⁴ at Erlang factory lite, London
9. November 2012. Roberto Aloï presented a talk, "[Erlang and the Cloud](#)" at the [Codemotion 2012](#), in Venice.
10. June 2013. Huiqing Li presented a talk, "[Profiling with Percept2](#)"³⁵ at the [Erlang User Conference](#)³⁶, in Stockholm.
11. June 2013. Stavros Aronis presented a talk, "[Parallel Erlang - Speed beyond Concurrency](#)"³⁷ at the [Erlang User Conference](#)³⁵, in Stockholm.

²⁸ <http://www.erlang-factory.com/conference/SFBay2012/speakers/SimonThompson>

²⁹ <http://www.erlang-factory.com/conference/SFBay2012/speakers/KostisSagonas>

³⁰ <http://www.erlang-factory.com/conference/ErlangUserConference2012/speakers/RickardGreen>

³¹ <http://www.erlang-factory.com/conference/StAndrews/speakers/KennethLundin>

³² <https://github.com/release-project/RELEASE/raw/master/research/Docs/Talks/Factory%20Lite%20-%20SD%20Erlang%20Design.ppt>

³³ <http://www.erlang-solutions.com/news/2/entry/1287>

³⁴ <http://www.erlang-factory.com/conference/London2012/speakers/SimonThompson>

³⁵ <https://www.erlang-factory.com/conference/ErlangUserConference2013/speakers/HuiqingLi>

³⁶ <https://www.erlang-factory.com/conference/ErlangUserConference2013>

12. June 2013. David Klaftenegger and Kjell Winblad presented a talk, "[Scalable ETS: Does Such a Thing Exist?](#)"³⁸ at the [Erlang User Conference](#)³⁵, in Stockholm.
13. June 2013. Kostis Sagonas presented a talk, "[Finding Concurrency Errors using Concuerror](#)"³⁹ at the [Erlang User Conference](#)³⁵, in Stockholm.
14. Kostis Sagonas gave a talk, Finding Concurrency Errors using Concuerror, at the offices of Basho in Boston, MA, U.S.A.

4.3 Training courses

Erlang Solutions will develop training material for SD Erlang, the extended OTP and the tools, providing consulting services and commercial support. The services will include a range of sales and marketing collateral to ensure that potential partners and customers are made aware of their availability. The distinction between partners and customers is also critical. Partners will be most interested in the technical benefits of the solution whereas the customers will be more interested in the business benefits. This is why it is important during the project to collect and collate project data that can demonstrate benefits in terms of ROI, performance or reliability.

As the project develops their Tools, the relevant partner will produce tutorials that will then feed into material for **training courses** which Erlang Solutions will develop, deliver and add to its training portfolio.

5 Software Releases and Workshops

Almost all of the software being developed in the project is Open Source and uses Open Source tools such as GitHub as a repository for coordinating the produced code and deliverables. Aside from major releases of our developed tools – which will occur on an approximately annual timetable, the project intends to make small releases that will be announced to the Erlang community through the usual channels (email, discussion group, workshop announcement etc.).

In December 2013, the partners plan to hold a **project workshop** which is intended to allow project members to get early, informed, feedback on the tools from a User community through presenting it to the participants in the form of a tutorial, as well as allowing members of the project to hear about related developments from participants outside the project. A one day **multi-track** event will be organised to maximise attendance and use time effectively.

The workshop is planned to take place just after CodeMesh which will take place on 4-5 December 2013. CodeMesh follows on from TechMesh which took place last year. It contained 8 tracks over two days with 50 speakers from all around industry. The audience will not necessarily be wholly Erlang focused, but the workshop will be attractive to those who have used Erlang, or are interested in the development of multicore systems. In addition, the sheer breadth of the topics covered in the conference will help us in disseminating RELEASE results to areas of industry that may have hitherto not utilised Erlang on many-core systems.

The **promotion** for both the EUC and the Workshop is done via many routes:

- Posting the event on the following websites: LinkedIn, Facebook, Twitter, and Meetup
- Email invitations to all those who had attended the EUC over the last 5 years
- Erlang Factory conference mailing list
- Erlang Newsletter
- Email invitations to academics and industrialists with interests in the work of the project.

³⁷ <https://www.erlang-factory.com/conference/ErlangUserConference2013/speakers/StavrosAronis>

³⁸ <https://www.erlang-factory.com/conference/ErlangUserConference2013/speakers/DavidKlaftenegger>

³⁹ <https://www.erlang-factory.com/conference/ErlangUserConference2013/speakers/KostisSagonas>

5.1 Tools

Throughout the project, the partners are and will develop tools that facilitate the development and analysis of Erlang programs. These tools include those listed below.

- [Benchelr](#)⁴⁰ – A publicly available scalability benchmark suite for applications written in Erlang, using the Erlang/OTP system in particular. In contrast to other benchmark suites, which are usually designed to report a particular performance point, our benchmark suite aims to assess scalability, i.e., a set of performance points that show how an application's performance changes when additional resources (e.g. CPU cores, schedulers, etc.) are added.
- [ErLLVM](#)⁴¹ – A project which aims at providing multiple back ends for the High Performance Erlang (HiPE) with the use of the Low Level Virtual Machine (LLVM) infrastructure. Currently, it supports the AMD64 and x86 architectures.
- Percept2: this extension of the Percept tool from the Erlang/OTP distribution supports scalable offline visualization of Erlang systems, and will be extended in the second year of the project directly to support SD Erlang.
- [DTrace-percept](#)⁴² – A DTrace back-end for percept, to be used as an off-line and (later) on-line profiling tool for Erlang applications. Under development.
- [Parallel Dialyzer](#)⁴³ – A parallel version of the Dialyzer static analysis tool included in the Erlang/OTP release R15B02 (September 5th 2012).

Other tools, such as [Wrangler](#), which were initially developed before the project started, will be **enhanced** with various features that contribute to the overall goals of RELEASE. In addition, Erlang Solutions has been working on a scalable virtualization infrastructure Wombat which aims to dynamically utilize hardware supplied by cloud providers such as Amazon Web Services to deploy and configure distributed Erlang applications across an arbitrarily large number of nodes.

5.2 Contributions to Standards and Open Source Software

The RELEASE project aims to revise and improve upon the Erlang/OTP standards that are widely used. These standards are maintained by the partner Ericsson AB, thus affording the project an advantage in widespread adoption of its final product. The project intends to extend the core Erlang language into Scalable Distributed (SD) Erlang as well as adding scalable reliability to the existing OTP standard.

The project also aims to advance the state of the art in Cloud APIs in the areas of ad hoc and capability-driven allocation of resources – such as clouds which automatically scale as according to the needs of the running process.

The Parallel Dialyzer developed by Uppsala is now included as a part of the Erlang/OTP toolset as of September 2012.

⁴⁰ <http://release.softlab.ntua.gr/benchelr/>

⁴¹ <http://erllvm.softlab.ntua.gr/>

⁴² <https://github.com/k4t3r1n4/dtrace-percept>

⁴³ <https://github.com/aronisstav/otp>

6 Conclusion

We have developed, and are pursuing a multi-strand dissemination plan. We are engaging the public via a website, press releases, posters etc (Section 2). We are engaging the scientific community with publications, talks, and interactions with related projects etc. To date, we have published 15 papers and given 18 scientific talks (Section 3). We are engaging the commercial sector with Web 2.0 media and have given 14 presentations at industry forums (Section 4). We are contributing open source software and have delivered to 5 projects already, including improving the Erlang Virtual Machine, improved profiling tools, and providing a benchmark suite (Section 5). We are undertaking a number of other dissemination activities.

We have engaged with other European research projects, most notably with other Cloud projects and with the ParaPhrase project – in order to cross-pollinate ideas and identify areas for collaborative work (Section 3.4).

Date	Version	Comments
30/9/2012	1.0	First version submitted to the Commission.
16/9/2013	1.1	2013 version submitted to internal review.
30/9/2013	1.2	2013 version submitted to the Commission.