

COST Action IC1201  
Behavioural Types for Reliable Large-Scale Software Systems  
(BETTY)  
Activity Report 2013/14

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## 1 Introduction

This report describes the activities of COST Action IC1201 (Behavioural Types for Reliable Large-Scale Software Systems) during its second year. The period covered is 26th October 2013 to 25th October 2014. Most of the information in this report can also be found on the Action's web site at [www.behavioural-types.eu](http://www.behavioural-types.eu), along with the complete programmes of the meetings and workshops.

## 2 Membership

The number of participating countries has remained constant at 22. Argentina applied to join as a participating international partner country, and was accepted. The email list for the Action has 135 subscribers. The numbers of subscribers to the email lists for each Working Group are: WG1 (Foundations): 67; WG2 (Security): 40; WG3 (Languages): 59; WG4 (Tools & Applications): 43. These figures are small increases compared with the end of the first year. Most people are members of more than one Working Group. The total number of people who have attended at least one WG/MC meeting since the beginning of the Action is 108. The Training School had 35 trainees.

## 3 Working Group Meetings

We held three Working Group meetings during the year. The first was a special meeting to discuss possibilities for Horizon 2020. The other were combined meetings of all the WGs, and included Management Committee meetings. The first of these was co-located with the ETAPS conference in Grenoble in April 2014, and the second was co-located with the CONCUR conference in Rome in August 2014. The Horizon 2020 meeting resulted in the formation of two groups. One submitted a proposal called ARCTIC to a call in September 2014, but this was not funded. The second developed a proposal called TIMBRE, intended for a call in April 2014, but this was not submitted because the main industrial collaborator withdrew. Instead, a similar group submitted a proposal called BISCUIT to a call in April 2015.

### 3.1 First General WG Meeting: 13th April 2014

This meeting took the form of a mini-workshop, in which several Action members presented recent research. The three main themes were: (1) connections between behavioural types and logic; (2) type systems for liveness and deadlock-freedom; (3) choreography. There was also a session devoted to discussion of future work within the Action.

### **3.2 Second General WG Meeting: 31st August 2014**

This meeting was organised into four sessions, one for each Working Group. Working Groups 1 and 2 used their sessions to report on recent research carried out during STSMs; there were several presentations by STSM recipients. The Working Group 3 session began with an overview of activity, by the Chair and Vice Chair, and continued with three short presentations on progress with the integration of behavioural types into programming languages. The Working Group 4 session was devoted to presentation of potential new case studies for behavioural typing, especially in the area of telecommunication protocols.

## **4 Open Workshop: BEAT 2014**

We organised the next workshop in the BEAT (Behavioural Types) series. It was co-located with the CONCUR conference on 1st September 2014, in Rome, the day after the WG/MC meeting. The workshop issued an open call for papers. As part of our plan to study expressiveness issues in behavioural typing, we organised a keynote speaker jointly with the EXPRESS / SOS workshop (Expressiveness in Concurrency / Structural Operational Semantics). The speaker was Professor Vladimiro Sassone (University of Southampton, UK). He was funded by the Action. The topic of his lecture was the development of a computational model for the internet of things. This was highly relevant to the Action, as many members had been developing an interest in the internet of things as a potential application area for behavioural types; indeed, a proposal was submitted to the Horizon 2020 Internet of Things call in April 2015.

The workshop was well attended, but the number of submissions was relatively small and they were almost entirely from active Action members. In order to broaden the scope of the workshop and increase its appeal to a wider community, we accepted an offer from the organisers of the Workshop on Web Services and Formal Methods to combine the two events for 2015. The combined symposium will be co-located with the CONCUR conference in Madrid in September 2015.

## **5 State-of-the-Art Reports (SOARs)**

Working Groups 1, 2 and 3 have produced state-of-the-art reports (SOARs). These are available on the Action website and have been submitted for publication in journals. Working Group 4 has not yet produced a SOAR, but a catalogue of programming languages and tools has been placed on the Action website and will form the basis for a SOAR later in the Action.

## **6 Short-Term Scientific Missions (STSMs)**

Participants in the Action have enthusiastically taken advantage of the funding for Short-Term Scientific Missions (STSMs). This was expected, as an established style of collaboration in our community is to make one or more short visits and follow up with online communication. Some people have undertaken more than one STSM; some people have hosted more than one STSM; some people have been both host and visitor in different STSMs; there have been some “multi-party” STSMs involving two or more simultaneous visits to the same host.

A complete list of STSMs appears on the Action website. During the second year there were 32 STSMs.

## **7 Training School**

A Training School took place in Lovran, Croatia, from 30th June to 4th July 2014. Nine lecturers covered a range of topics on the theory and applications of behavioural types. There were 35 trainees,

of whom 32 were funded by the Action and 3 attended at their own expense. The tutorial material has been published on the Training School website: [summerschool2014.behavioural-types.eu](http://summerschool2014.behavioural-types.eu).

## **8 Publications and Other Dissemination**

Action members have produced a large number of workshop, conference and journal publications. A complete list appears on the Action website.

Dr Fabrizio Montesi was funded to give a keynote lecture at the Workshop on Web Services and Formal Methods in September 2014. His lecture covered topics related to the Action, and included an overview of the work of the Action.

## **9 Conclusion**

The second year of the Action has been successful, with productive scientific meetings, a good number of STSMs, and many publications in international conferences and workshops. State-of-the-art reports have been produced in the areas of Working Groups 1, 2 and 3, and these will be valuable resources for researchers within and outside the field. The activities planned for the third year are broadly similar to those carried out in the second year, except that there will not be a Training School.