

COST

Domain Committee

"Information and Communication Technologies (ICT)"

COST Action IC0702

Start Date (01.04.2008)

*Combining Soft Computing Techniques and
Statistical Methods to Improve Data Analysis
Solutions*

MONITORING PROGRESS REPORT

Reporting Period: from 01.07.2010 to 02.05.2011

This Report is presented to the relevant Domain Committee.
It contains three parts:

- I. Management Report*** prepared by the COST Office/Grant Holder
- II. Scientific Report*** prepared by the Chair of the Management Committee of the Action
- III. Previous versions of the Scientific Report;*** i.e., part II of past reporting periods

The report is a "cumulative" report, i.e. it is updated annually and covers the entire period of the Action.

Confidentiality: the documents will be made available to the public via the COST Action web page except for chapter *II.D. Self evaluation*.

Based on the monitoring results, the COST Office will decide on the following year's budget allocation.

Executive summary (max.250 words):

In the reporting period COST Action IC0702 was very successful in strengthening the dialogue between the statistics and soft computing communities in several ways: (1) The Action organized a conference, the topic of which exactly matches the objectives of the action, namely Soft Methods in Probability and Statistics (SMPS 2010), which attracted about 120 participants and led to a fruitful scientific exchange with its rich research program. (2) Up to now 15 short-term scientific missions have been approved and partially been carried out, with all visitors being early stage researchers and more than half of them women. (3) In the two work group meetings (each covering all three work groups) serious efforts were made to bring together groups of people with similar and related research interests in order to proceed to putting together EU research proposals. However, albeit lively and fruitful discussions uncovered promising connections and potential topics, no proposal leaders would emerge (hindered also by the limited range of topics in the EU FP7 ICT calls), due to which the Action still falls short on its goal to submit an EU research proposal. We believe, though, that especially the STSMs, with which we are very satisfied, make up for this drawback and we can reasonably claim to have had a successful year.

I. Management Report prepared by the COST Office/Grant Holder



I.A. COST Action Fact Sheet

• **COST Action IC0702 - Combining Soft Computing Techniques and Statistical Methods to Improve Data Analysis Solution**

• **Domain Information and Communication Technologies (ICT)**

• **Action details:**

CSO Approval: 16.11.2007

End date: 20.03.2012

Entry into force: 10.01.2008

Extension: -

• **Objectives**

The main objective of the Action is to strengthen the dialogue between the statistics and soft computing research communities in order to cross-pollinate both fields, generate mutual improvement activities, spark new ideas, and trigger new research lines and projects.

• **Parties:** *list of countries and date of acceptance*

Austria 11/04/2008	Norway 17/03/2008
Belgium 10/01/2008	Poland 10/01/2008
Cyprus 22/10/2008	Portugal 10/04/2008
Estonia 14/05/2008	Spain 10/01/2008
France 17/01/2008	Switzerland 21/08/2008
Germany 10/01/2008	Turkey 03/09/2008
Hungary 22/02/2008	United Kingdom 10/01/2008
Italy 12/03/2008	Bulgaria 08/10/2010
Lithuania 08/08/2008	Greece 08/10/2010
Netherlands 07/02/2008	Luxembourg 08/10/2010
Serbia	Slovenia 08/10/2010

• **Intentions to accept:** -

• **Other participants:** -

Chair: *Dr Christian BORGELT, European Centre for Soft Computing, c/ Gonzalo Gutierrez Quiros s/n 33600 Mieres - Spain, Tel. +34 985456545, christian.borgelt@softcomputing.es*

DC Rapporteur: *Prof. Marco CHIANI, University of Bologna, Via Venezia 52, 47023 Cesena - Italy, Tel. +390547339222, marco.chiani@unibo.it*

Science Officer:

Dr. Jamsheed SHORISH, jamsheed.shorish@cost.eu

Administrative Officer:

Aranzazu SANCHEZ MEDINA, aranzazu.sanchez@cost.eu

• **Action Web site:** <http://www.cost-ic0702.org>

• **Grant Holder Representative:** *Raul DEL COSO, raul.delcoso@softcomputing.es*

Working Groups:

http://www.cost-ic0702.org/group_A.html

http://www.cost-ic0702.org/group_B.html

http://www.cost-ic0702.org/group_C.html

I.B. Management Committee member list

<i>Name</i>	<i>Country</i>
Prof. Reinhard VIERTL	Austria
Prof. Peter FILZMOSE	Austria
Prof. Michel VERLEYSEN	Belgium
Prof. Bernard DE BAETS	Belgium
Prof. Olga GEORGIEVA	Bulgaria
Prof. Erricos KONTOGHIOGHES	Cyprus
Prof. Christakis CHARALAMBOUS	Cyprus
Dr Jaak VILO	Estonia
Prof. Thierry DENOEU	France
Prof. Didier DUBOIS	France
Prof. Frank KLAWONN	Germany
Prof. Rudolf KRUSE	Germany
Dr Nikolaos S. THOMAIDIS	Greece
Prof. Kostas KARATZAS	Greece
Prof. Janos FODOR	Hungary
Prof. Renato COPPI	Italy
Dr Mario GUARRACINO	Italy
Dr Olga KURASOVA	Lithuania
Prof. Raimundas JASINEVICIUS	Lithuania
Dr Bernabe DORRONSORO	Luxembourg
Dr Gregoire DANOY	Luxembourg
Prof. Uzay KAYMAK	Netherlands
Dr Jan VAN DEN BERG	Netherlands
Prof. Tormod NAES	Norway
Prof. Janusz KACPRZYK	Poland
Prof. Olgierd HRYNIEWICZ	Poland
Dr Joao M. DA COSTA SOUSA	Portugal
Prof. Dubravko CULIBRK	Serbia
Prof. Jus KOCIJAN	Slovenia
Dr Christian BORGELT	Spain
Prof. Maria Angeles GIL	Spain
Prof. Fabio CRESTANI	Switzerland
Prof. Manfred GILLI	Switzerland
Prof. Bülent TÛTMEZ	Turkey
Prof. Işıl EROL	Turkey
Raul DEL COSO	Spain

See also <http://www.cost-ic0702.org/members.html>, which contains links to the home pages of all MC members.



I.C. Overview activities and expenditure

1 Apr 2008-30 Jun 2008

Total Action Budget: 21.965,00€

Meetings

Meeting Type	Number				Total
WG	1				12.339,43
DC	1				919,95

STSM

Beneficiary	Number				Total
					0

Workshops

Beneficiary	Number				Total
E.Kontoghiorghes	1				3.000,00

General Support Grants

Beneficiary	Number				Total
					0

Schools

Title	Number				Total
					0

Dissemination

Title	Number				Total
					0

Others

Type	Total
Secretarial support	2.438,91

Action Total : 18.698,29

Further details can be found in the financial reports



1Jul 2008-30Jun 2009

Total Action Budget: 114.782,84€

Meetings

Meeting Type	Number				Total
WG & MC	2				46.048,43

STSM

Beneficiary	Number				Total
	15				17.150,00

Workshops

Beneficiary	Number				Total
					0

General Support Grants

Beneficiary	Number				Total
					0

Schools

Title	Number				Total
Spring School	1				35.158,82

Dissemination

Title	Number				Total
					14.828,24

Others

	Total
Bank charges	497,68
Secretarial Support	14.828,24

Action Total : 113.683,17 €

Further details can be found in the financial reports



1Jul 2009-30Jun 2010

Total Action Budget: 100.000,00€

Meetings

Meeting Type	Number				Total
WG&MC	2				59.030,81

STSM

Beneficiary	Number				Total
Several	17				28.020,00

Workshops

Beneficiary	Number				Total
					0

General Support Grants

Beneficiary	Number				Total
					0

Schools

Title	Number				Total
Summer school	1				5.798,04

Dissemination

Title	Number				Total
					0

Others

	Total
Secretarial Support	6.679,11
Bank charges	472,04

Action Total : 100.000,00

Further details can be found in the financial reports



1Jul2010-2May2011

Total Action Budget: 87.600,00

Meetings

Meeting Type	Number				Total
MC&WG	2				45.000,00

STSM

Beneficiary	Date	Place			Total
Several	Several	Several			25.000,00

Workshops

Title	Date		Place		Total
	From	To			

General Support Grants

Beneficiary	Date				Total
					0

Schools

Title	Date	Place			Total

Dissemination

Title	Date	Place			Total
					0

Others

	Total
Bank charges	400,00
Secretarial Support	10.500,00

Further details can be found in the intermediate financial report & e-COST application



2May2011-30Jun2011

Total Action Budget: 87.600,00

Meetings

Meeting Type	Date	Place			Total

STSM

Beneficiary	Date	Place			Total
Several	Several	Several			5.000,00

Workshops

Title	Date		Place		Total
	From	To			

General Support Grants

Beneficiary	Date				Total
					0

Schools

Title	Date	Place			Total

Dissemination

Title	Date	Place			Total
					0

Others

	Total
Secretarial Support	750,00

Further details can be found in the e-COST application

II. Scientific Report

Additional material can be found on the Action web site: <http://www.cost-ic0702.org/>

II.A. Innovative networking

The Action intensified its networking activities by organizing two MC and work group meetings as well as an international conference, which covered exactly the topics and general objectives of the Action, namely the 5th International Workshop on Soft Methods in Probability and Statistics (SMPS 2010, <http://www.cost-ic0702.org/smps2010/>). This conference, which was held from September 28 to October 1, 2010, in Mieres and Oviedo, Asturias, Spain, attracted about 120 participants, and featured 24 sessions in which 95 published papers (proceedings published by Springer) and some unpublished material was presented. In addition, 4 plenary talks by renowned researchers completed the program. In the sessions as well as in the coffee breaks members of the Action as well as outsiders engaged in lively and fruitful discussions, some of which led to new research contacts that are partially pursued within the Action.

Originally it had been planned to hold a summer course or spring school during the reporting period, but this plan was abandoned even before the reporting period started, when the insecure budget situation became known, according to which a lower budget would be available. We regret this, because we had promising plans to link especially with the artificial neural networks community (as one of the main constituents of soft computing). If we had known that a budget extension would be granted later in the reporting period, we could have pursued this plan and would have been able now to report on a likely very successful summer course.

The first MC and work group meetings in the reporting period were held on October 1 and 2, 2010, in the Hotel Barcelo Cervantes, Oviedo, Spain, that is, directly after the SMPS 2010 conference, which reduced the reimbursement costs. In this meeting we continued the strategy of earlier meetings to form discussion groups on more focused research topics in order to make progress towards potential EU proposals. In these work group meetings, this strategy was even more successful than earlier on, because the discussions were indeed more focused and goal-oriented. However, the fact that the EU FP7 call does not contain topics that are sufficiently close to the Action's objectives proved to be a severe hindrance to coming up with promising topics that are supported by sufficiently many members of the action. A continuation of the discussions by email led at least to a first draft proposal for a health-care topic, which, however, did not make it to the stage of submission, since the time until the submission deadline proved to be too short to properly collect and organize the proposal and bring together a consortium that would have reasonably high chances of getting approved. A second topic, focussing on the topics called for w.r.t. environmental issues, on which we had placed some hopes, never even made it to the draft stage, since the number of people in the action with experience in this particular field of application proved to be too small. This became obvious at the second MC and work group meetings, which were held on March 28, at the Erasmus University of Rotterdam, Netherlands. In this meeting, which we had restricted to one day due to the originally very limited budget, we explored, in a very open discussion, a broad range of potential topics for research proposals. However, limited by the EU call, but also by the lack of leaders for the proposed topics, we have not been able to identify a topic yet on which at least another draft proposal could be based.

The current plan to continue working towards a research proposal consists in taking a look at the next EU call that is issued and directly reacting to it in the next MC and work group meetings, which will be held on October 27-28, 2011, at the University of Lisbon, Portugal, directly before the IDA 2011 Symposium, which is held in Porto.

Albeit having been unable up to now to reach the submission stage for a research proposal, we believe that the number and durations of the STSMs that have been approved and partially already been carried out in the Action still render the reporting period successful. Up to now 15 STSMs have been approved, all of which are carried out by early stage researchers, more than half of which are women. We are particularly proud that we could motivate six visitors to stay six weeks and longer, another four to stay four weeks (see details below). Although short stays help in setting up connections and can be very fruitful, we believe that it is mainly the longer stays that lead to intense scientific exchange and substantial results.

II.B. Inter-disciplinary networking

Being located at the border of two related, but not very well communicating research areas, namely Soft Computing and Statistics, COST Action IC0702 is naturally highly interdisciplinary. Hence basically all progress that was reported under II.A could also be listed in this section.

II.C. New networking

Up to now, the Action has brought together more than 80 researchers from a wide range of different backgrounds.

In the COST year 2010/2011 a total of 15 STSMs have been approved (up to now). All of these were/will be executed by early stage researchers, more than half of which are women. In detail, the following STSMs were/will be carried out:

- **STSM-COST-IC0702-6616** (period: 09.09.-31.10.2010)
Topic: A Linearity Test for Imprecise Response
Visitor: Maria Brigida Ferraro (early stage researcher), Sapienza University of Rome, Italy
Host: Ana Colubi, University of Oviedo, Spain
- **STSM-COST-IC0702-6893** (period: 25.10.-30.11.2010)
Topic: Soft-computing and Parametric Techniques for the Estimation of the Financial Asset Return Density
Visitor: Nikolaos Thomaidis (early stage researcher), University of the Aegean, Chios, Greece
Host: Uzay Kaymak, Erasmus University Rotterdam, Netherlands
- **STSM-COST-IC0702-7127** (period: 26.04.-03.05.2010)
Topic: Graph-based Strategies for Solving Combinatorial Statistical Problems
Visitor: Cristian Gatu (early stage researcher), University of Iasi, Romania
Host: Alina Matei, University of Neuchatel, Switzerland
- **STSM-COST-IC0702-7149** (period: 18.04.-27.05.2011)
Topic: Constructing Rule-based Models using the Belief Functions Framework
Visitor: Rui Jorge Almeida (early stage researcher), Erasmus University Rotterdam, Netherlands
Host: Thierry Denoeux, Université de Technologie de Compiègne, France
- **STSM-COST-IC0702-7650** (period: 21.01.-25.02.2011)
Topic: Testing Linearity for a Regression Model with Imprecise Elements: A Power Analysis
Visitor: Maria Brigida Ferraro (early stage researcher), Sapienza University of Rome, Italy
Host: Gil Gonzalez-Rodriguez, University of Oviedo, Spain
- **STSM-COST-IC0702-7659** (period: 15.02.-08.03.2011)
Topic: Fuzzy Summarization of Gradual Sets
Visitor: Daniel Sanchez (early stage researcher), European Centre for Soft Computing, Mieres, Spain
Host: Didier Dubois, Institut de Recherche en Informatique de Toulouse, France
- **STSM-COST-IC0702-7684** (period: 12.02.-19.02.2011)
Topic: Analysis and Reduction of the Effects of Artificial Hubness on Soft Computing Techniques
Visitor: Thomas Low (early stage researcher), Otto-von-Guericke University Magdeburg, Germany
Host: Christian Borgelt, European Centre for Soft Computing, Mieres, Spain
- **STSM-COST-IC0702-7915** (period: 25.04.-25.06.2011)
Topic: Statistical Robustness for Random Fuzzy Sets
Visitor: Beatriz Sinova (early stage researcher), University of Oviedo, Spain
Host: Stefan Van Aelst, Ghent University, Ghent, Belgium
- **STSM-COST-IC0702-7930** (period: 25.04.-25.06.2011)
Topic: Likert and Fuzzy Scales: Comparison Through Sensitivity Analysis
Visitor: Sara de la Rosa de Saa (early stage researcher), University of Oviedo, Spain
Host: Stefan Van Aelst, Ghent University, Ghent, Belgium
- **STSM-COST-IC0702-7948** (period: 01.04.-01.06.2011)
Topic: Data Analysis Merging Variability and Imprecision: Potential Applications in Econometrics

- Visitor: Ana Belen Ramos-Guajardo (early stage researcher),
European Centre for Soft Computing, Mieres, Spain
- Host: George Kapetanios, Queen Mary University, London, United Kingdom
- **STSM-COST-IC0702-7954** (period: 12.03.-25.04.2011)
Topic: Robust Methods for the Detection of Anomalies in Internet Traffic Flows
Visitor: Claudia Margarida Lopes Pascoal (early stage researcher),
Technical University of Lisbon, Portugal
Host: Peter Filzmoser, Vienna University of Technology, Vienna, Austria
 - **STSM-COST-IC0702-7970** (period: 26.04.-07.05.2011)
Topic: Updating and DOWndating Simultaneous Equations Models
Visitor: Stella Hadjiantoni (early stage researcher), University of Cyprus, Nicosia, Cyprus
Host: Manfred Gilli, University of Geneva, Switzerland
 - **STSM-COST-IC0702-8076** (period: 30.05.-05.06.2011)
Topic: Modeling Document Scores for Distributed Information Retrieval
Visitor: Ilya Markov (early stage researcher), University of Lugano, Switzerland
Host: Michail Salampassis, Alexander Technological Educational Institute,
Thessaloniki, Greece
 - **STSM-COST-IC0702-8167** (period: 23.05.-17.06.2011)
Topic: Development of Novel Techniques for the Smarter and Practical
Expression of Information for Intelligence Purposes
Visitor: Katharina Tschumitschew (early stage researcher),
Ostfalia University of Applied Sciences, Wolfenbüttel, Germany
Host: Xiaohui Liu, Brunel University, London, United Kingdom
 - **STSM-COST-IC0702-8178** (period: 01.05.-30.06.2010)
Topic: Data Mining of Time Series Data Stream
Visitor: Lidia Rivoli (early stage researcher), University of Naples Federico II, Italy
Host: Djamel Abdelkader Zighed, University of Lyon 2, France

II.D. Self evaluation

As already mentioned above, the Action still struggles with bringing a research proposal to the submission stage, even though at least one draft proposal was produced (but could not be developed in time for the submission deadline). There are two main obstacles that we identified in this process: In the first place, the current EU call is not well geared to the topics and objectives of the Action. In the ICT domain, there are fairly few subject areas one could reasonably mold our main research topics to, thus making it difficult to shape a proposal. In other areas, which we have explored in open and broad discussions, we have usually a few, but rarely enough people that are familiar with the particular application area and its problems. The second main problem is that during the discussions no leaders emerged that were willing to take on the task of collecting the input from various participants and organize it into a proposal. The reasons for this are manifold. The problematic topic situation contributes (no one wants to lead a proposal in an area he or she is not very familiar with, especially if there are few others that are familiar with the area), but also generally the amount of work a proposal leaders has to invest is, given the relatively low acceptance rate for project proposals, a serious hindrance. However, we can at least say that we made extensive efforts to overcome these problems and explore all possible topics and directions.

Albeit on the research proposal frontier the action is struggling and has not reached its envisioned goals, we are very happy with the STSMs that have been carried out in the Action so far (or have been approved for the rest of the reporting period). That all of the visitors in these STSMs are early stage researchers and more than half of them women, and the fact that a large part of them are longer term stays (almost half are six weeks and longer, four more are at least four week stays) shows that the STSMs are used for intense scientific exchange that has and still can produce substantial results.

III. Scientific Report 2009/1010

Additional material, especially the tutorial slides of the work group meetings in October 2009, can be found on the Action web site: <http://www.cost-ic0702.org/>

III.A. Innovative networking

The Action continued its networking activities in the second half of 2009 with MC and work group meetings as well as special COST Action IC0702 sessions that were held in parallel with the 2nd ERCIM Work Group Meeting on Computing and Statistics (October 29-31, Grand resort Hotel, Limassol, Cyprus). In particular, a Track on "Fuzzy Statistical Analysis" was organized by members of COST Action IC0702 at this conference. Thus the Action followed up on the connection established in 2008 with COST Action IC0702 sessions at the 1st Workshop of the ERCIM Work Group on Computing and Statistics (2008, Neuchâtel, Switzerland). With this continued collaboration a strong tie with the statistical community, which is mainly represented by the members of the ERCIM Work Group, could be established. Furthermore, the meetings of work groups A and B were co-organized with the last day of the COMISEF tutorial on Statistical Model Selection, thus introducing still another link to the statistical community.

On the other hand, COST Action IC0702 organized a summer course on "Soft Computing and Statistics" that was co-located with the 13th Int. Fuzzy Systems Association World Congress and the 6th Conf. of the European Society for Fuzzy Logic and Technology (IFSA/EUSFLAT 2009, Lisbon, Portugal) and used the conference tutorials as its final day, thus allowing to have speakers from the US (<http://www.cost-ic0702.org/summercourse/>). With this summer course the connection to the soft computing community, especially the fuzzy systems community was strengthened and very good visibility was given to the action.

In the second set of MC and work group meetings, held on March 29-30 at the Technical University of Vienna, Austria, the focus was making progress towards possible research proposals and projects. After earlier meetings provided insights into the mutual research interests of the Action participants, we tried in discussions to narrow down the set of possible joint research directions, to which a sufficient number of researchers could contribute, in order to reach the threshold for a proposal. In work group C (Statistics with Imprecise and Incomplete Data), we tried to do this in parallel sessions, in order to make the discussions more focussed, hoping to achieve faster progress in this way. We plan to continue this scheme in the next meeting.

As in the preceding COST year, the main research results were and will be achieved in the short-term scientific missions, of which eighteen (and thus twice as many as in 2008/2009) were or will be completed until the end of the COST year 2009/2010 (see II.C for details). The subject areas of these STSMs covered applications of statistical and soft computing techniques in diverse areas, especially statistics with fuzzy and incomplete data as well as temporal, spatial, and graph data, but also decision support, model evaluation, mining document collections, interest rates and option pricing, optimization etc. Most of these STSMs lasted 3-4 weeks, and some even longer, thus providing the opportunity for significant research advancements. Of those STSMs that have already been completed (a large part is set to be executed in May and June), the one by Giorgio Russolillo can be considered particularly successful. It lasted for more than three months and led to two draft research papers and the establishment of a strong tie between the sending and the host institution. Similar results can be expected from the STSM by Beatriz Sinova.

The connection to COST Action IC0801, which was initiated with a jointly organized spring school in 2008, will be continued by Frank Klawonn, vice chair of COST Action IC0702, attending the meeting of COST Action IC0801 that will be held on June 4, 2010, in Heraklion, Greece.

The creation of national or European research proposal or projects continues to be the weak point of the action. Although some progress towards narrowing down the set of possible subjects was made, the Action has still not entered the stage of putting together a concrete proposal. The reason is the same as in the first year, namely that bridging the gap between the individual research areas of the members of the action is very time consuming and a serious challenge. By parallelizing the discussions in future work group meetings (which was tried already in the Vienna meeting of work group C, see above), we try to speed up the process and try to achieve more focussed and more goal-oriented discussions.

III.B. Inter-disciplinary networking

Being located at the border of two related, but not very well communicating research areas, namely Soft Computing and Statistics, COST Action IC0702 is naturally highly interdisciplinary. Hence basically all progress that was reported under II.A could also be listed in this section. In particular, we continue the link with COST Action IC0801, which started with the jointly organized spring school in 2009, by an exchange of members (invited as external experts under the COST regulations) for the MC and work group meetings of the two Actions. A visit of a member of COST Action IC0702 to the next meeting of COST Action IC0801 on June 4, 2010, in Heraklion, Greece, is already fixed, an informal invitation to a member of COST Action IC0801 to attend the next meeting of COST Action IC0702 on October 1-2, 2010, in Mieres (Asturias), Spain, has been sent to the chair of COST Action IC0801.

As a perfect platform for interdisciplinary approaches to data analysis and scientific exchange, COST Action IC0702 co-organizes the 5th Int. Conference “Soft Methods in Probability and Statistics” on September 28 to October 1, in Mieres (Asturias), Spain. As the title already indicates, this conference is directly devoted to the topics of the Action and is intended to bring together researchers from the statistics and soft computing communities (especially fuzzy theory, but also Dempster-Shafer and imprecise probabilities etc). This conference had more than 100 submissions, of which 78 were accepted as regular papers. The proceedings will be published in the series “Advances in Intelligent and Soft Computing”, Springer-Verlag, Berlin, Germany.

III.C. New networking

Up to now, the Action has brought together a total of 63 researchers from different backgrounds and thus has grown by 27% from its size of 48 researchers at the end of COST year 2008/2009. They come from a total of 22 countries (4 more or a growth by 22% compared to the COST year 2008/2009), are represented by 35 management committee members, and include 14 women (22%, 8 more or a growth by 114% compared to the COST year 2008/2009) and 21 early stage researchers (33%). In addition, 12 people that are not MC or work group members, carried out STSMs in the COST year 2009/2010. Counting these, a total of 75 people were actively participating in the action.

In the COST year 2009/2010 a total of eighteen STSMs were approved. Fourteen of these STSMs were/will be carried out by early stage researchers (78%), and six STSMs visitors are women (33%). In detail, the following STSMs were/will be carried out:

- **STSM-COST-IC0702-0902** (non-eCOST id; period: 11.11.-30.11.2009)
Topic: Robust Statistical Methods and Imperfect Data
Visitor: Dr. Gil González-Rodríguez (early stage researcher),
European Centre for Soft Computing, Mieres, Spain
Host: Prof. Stefan van Aelst, University of Ghent, Belgium
- **STSM-COST-IC0702-0903** (non-eCOST id; period: 09.12.2009-23.12.2009)
Topic: Model Selection for Regression Models: Application to Interval Data
Visitor: Dr. Marc Hofmann (early stage researcher), University of Neuchatel, Switzerland
Host: Dr. Gil González-Rodríguez, European Centre for Soft Computing, Mieres, Spain
- **STSM-COST-IC0702-5963** (period: 31.05.-20.06.2010)
Topic: Independence Concept and Model Evaluation in Imprecise Probability Theory
Visitor: Dr. Sebastien Destercke (early stage researcher), CIRAD, Montpellier, France
Host: Prof. Serafin Moral, University of Granada, Spain
- **STSM-COST-IC0702-6028** (period: 24.05.-24.06.2010)
Topic: Appraising Spatially Varying Data by Machine Learning Algorithms
Visitor: Dr. Bülent Tütmez (early stage researcher), Inonu University, Malatya, Turkey
Host: Prof. Mikhail Kanevski, University of Lausanne, Switzerland
- **STSM-COST-IC0702-6029** (period: 08.05.-20.05.2010)
Topic: Temporal-based Dependency Detection of Streaming Data
Visitor: Mr Mostafa Kheika (early stage researcher), University of Lugano, Switzerland
Host: Prof. Stefano Leonardi, Sapienza University of Rome, Italy
- **STSM-COST-IC0702-6060** (period: 19.04.-02.05.2010)
Topic: Data Mining Methods to Improve Real-time Systems for Intuitive and Interpretable Decision Support
Visitor: Dr. Olga Georgieva, Sofia University, Bulgaria

- Host: Prof. Frank Klawonn, University of Applied Sciences
Braunschweig/Wolfenbüttel, Germany
- **STSM-COST-IC0702-6141** (period: 28.05.-28.06.2010)
Topic: Estimation of Multiple Linear Models with Interval Data:
Numerical and Computational Strategies
Visitor: Prof. Ana Colubi, University of Oviedo, Spain
Host: Prof. Erricos Kontoghiorghes, University of Cyprus, Nicosia, Cyprus
 - **STSM-COST-IC0702-6157** (period: 10.05.-24.05.2010)
Topic: Federated Search for Evolving Collections
Visitor: Mr Ilya Markov (early stage researcher), University of Lugano, Switzerland
Host: Dr. Leif Azzopardi, University of Glasgow, United Kingdom
 - **STSM-COST-IC0702-6231** (period: 04.06.-20.06.2010)
Topic: Multi Objective Optimization of Fuzzy Models in Genetic Algorithm
and Simulated Annealing
Visitor: Prof. Ayşen Apaydın, University of Ankara, Turkey
Host: João Miguel da Costa Sousa, Technical University of Lisbon, Portugal
 - **STSM-COST-IC0702-6235** (period: 01.05.-15.06.2010)
Topic: A Fuzzy Model of Interest Rates Based on Central Bank Announcements
Visitor: Mr Viorel Milea (early stage researcher), Erasmus University Rotterdam,
Netherlands
Host: Prof. Trevor Martin, University of Bristol, United Kingdom
 - **STSM-COST-IC0702-6238** (period: 01.04.-27.06.2010)
Topic: Robust Location Measures of Fuzzy-valued Random Elements/Data Sets
Visitor: Ms Beatriz Sinova (early stage researcher), University of Oviedo, Spain
Host: Prof. Stefan van Aelst, University of Ghent, Belgium
 - **STSM-COST-IC0702-6351** (period: 28.05.-28.06.2010)
Topic: New Arithmetic-based Linear Regression Models with Imprecise Information
Visitor: Dr. Gil González-Rodríguez (early stage researcher),
European Centre for Soft Computing, Mieres, Spain
Host: Prof. Erricos Kontoghiorghes, University of Cyprus, Nicosia, Cyprus
 - **STSM-COST-IC0702-6372** (period: 01.06.-21.06.2010)
Topic: Computing Option Price with Fuzzy Parameters
Visitor: Dr. Piotr Nowak, Polish Academy of Sciences, Warsaw, Poland
Host: Prof. Maria Angeles Gil, University of Oviedo, Spain
 - **STSM-COST-IC0702-6431** (period: 24.01.-31.01.2010)
Topic: Linking L-shape Data
Visitor: Dr. Isabella Endrizzi (early stage researcher),
IASMA Research and Innovation Centre, Trento, Italy
Host: Prof. Tormod Næs, Nofima mat, Ås, Norway
 - **STSM-COST-IC0702-6433** (period: 04.01.-29.01.2010)
Topic: Efficient Learning Algorithms for Cross-validation and Model Selection
on Graph Data
Visitor: Dr. Willem Waegeman (early stage researcher), Ghent University, Belgium
Host: Dr. Tapio Pahikkala, University of Turku, Finland
 - **STSM-COST-IC0702-6435** (period: 15.01.-30.04.2010)
Topic: A Comprehensive PLS Environment to Structural Equation Modeling
Visitor: Mr Giorgio Russolillo (early stage researcher), University of Naples, Italy
Host: Prof. Vincenzo Esposito Vinzi, ESSEC Business School of Paris, France
 - **STSM-COST-IC0702-6451** (period: 20.06.-25.06.2010)
Topic: New Approaches to Handling Uncertainties in Optimization
Visitor: Dr. Peter Bosman (early stage researcher),
Centrum Wiskunde & Informatica, Amsterdam, Netherlands
Host: Prof. Jürgen Branke, University of Warwick, United Kingdom
 - **STSM-COST-IC0702-6527** (period: 15.06.-30.06.2010)
Topic: Heuristic Algorithms for the Estimation of Regression Models with Interval Data
Visitor: Dr. Angela Blanco-Fernández (early stage researcher),

University of Oviedo, Spain
Host: Prof. Peter Winker, Justus-Liebig-University, Giessen, Germany

II.D. Self evaluation

As already mentioned above, the Action continues to struggle with focussing the individual research interests of its participants in such a way that a research or project proposal is written and submitted to a European funding agency (like the EU FP7 program). Bridging the gap continues to prove a challenge that is not easily overcome. Although some progress has been made, narrowing down the set of possible topics to a shortlist, the Action has still not entered the stage of actually writing on a proposal. We are painfully aware of this and have initiated measures to improve the situation, especially by parallelizing discussions during the meetings in order to make them more focussed and more goal-oriented.

On the other hand, significant scientific exchange could be achieved, especially by co-locating the MC and work group meetings in October with the ERCIM workshop (see above) and by co-organizing a summer course with the IFSA/EUSFLAT 2009 conference.

A clear improvement can be reported in terms of short-term scientific missions. While the first year saw us struggling to reach the envisioned number of ten STSMs, falling short by one (in the COST year 2008/2009 a total of nine STSM were carried out), this year we exceeded the projected number of fifteen STSMs by three, achieving eighteen STSMs, most of which were not just very short exchanges, but lasted 3-4 weeks, some even considerably longer. The results obtained in those STSMs that have already been carried out can confidently be called a great success, and those STSMs whose dates are still in future promise to be of a similar quality. As an instrument to stimulate scientific exchange between researchers, STSMs have now been recognized within the Action, making it much easier to find a sufficient number of candidates.

III. Scientific Report 2008/2009

More additional material, in particular the slides of several scientific presentations that were given at work group meetings and in the COST Sessions at ERCIM 2008, but also agendas, the Action poster, and other presentations, can be found on the Action web site: <http://www.cost-ic0702.org/>

III.A. Innovative networking

The Action started its networking activities with the Kickoff Meeting, held in Brussels (Belgium), March 31, 2008, where the organizational structure and the work groups were set up. This initial meeting already brought together several people who had not worked together before or did not even have direct contact before this Action was established.

In order to give the Action a quick start, three special sessions, one for each of the three working groups, were organized as part of the 1st Workshop of the ERCIM Work Group on Computing and Statistics, which was co-located with the 2nd Int. Workshop on Computational and Financial Econometrics (June 19-21, 2008, Neuchâtel, Switzerland). These sessions took place on June 19 and June 20, 2008. A total of 14 presentations were given by members of the Action's working groups. The purpose of these sessions was twofold: in the first place, they provided an opportunity for an initial exchange about the research areas of the work group members. Secondly, the co-location with two workshops that are strongly oriented towards statistics made it possible to attract attention from statisticians to soft computing techniques and combinations of statistical and soft computing approaches. Both purposes were successfully achieved, in particular, because the sessions attracted several other participants of the co-located workshops. A large part of the presentations of these sessions can be found at <http://www.cost-ic0702.org/ercim08.html>.

The exchange that was initiated in Neuchâtel was continued and intensified in two work group meetings in Warsaw (Poland), October 20-21, 2008, and Palma de Mallorca (Spain), March 16-17, 2009. Some of the presentations (slides) can be found on the Action web page: <http://www.cost-ic0702.org/meetings.html>. A difference to the Neuchâtel sessions was that more time was allocated for questions and discussions, which was well received by the participants and used extensively for animated discussions about the presentations.

The main research results were and will be achieved in the short-term scientific missions, of which nine were or will be completed until the end of the COST year 2008/2009 (see II.C for details). The subject areas of these STSMs covered applications of statistical and soft computing techniques in three main areas: (1) information retrieval (novelty detection, summarization, topic detection and tracking, opinion detection), (2) statistics with fuzzy data (hypothesis tests with imperfect data, linear regression with imprecise response, robust fuzzy regression), (3) knowledge discovery in complex and structured domains (mining stream data, change mining, spatial data analysis, feature selection). All of these projects address challenging problems and can be expected, on completion, to provide significant contributions to scientific progress.

A considerable success of the Action is the organization of a spring school (also supported by COST Actions IC0602 and IC0801) on “Reasoning and Decision Making under Uncertainty and Imprecision”, which will be held on May 18-20, 2009, at the European Centre for Soft Computing, Mieres, Spain (see <http://www.cost-ic0702.org/springschool/> for more information). Despite the short time that was available for the organization, it was possible to put together a fairly high class program, which not only furthers the networking activities within COST Action IC0702, but also initiates and strengthens links to COST Actions IC0602 and IC0801, which cover related areas. At the time of this writing we already have more than 30 registrations and thus can be confident that the spring school will be a significant success.

To date no national or European proposal or projects could be created. The main reason for this is that it proved even more difficult than expected to find common grounds for the diverse set of researchers gathered in this action. Even though difficulties were foreseen, the necessary exchange about the individual research areas proved to be very time consuming and a serious challenge. Nevertheless, a subgroup of working group C has been formed that more intensely pursues the goal of putting together a European Union research proposal.

III.B. Inter-disciplinary networking

The Action is inter-disciplinary at its core, since its goal is to bring together the disciplines of statistics and soft computing. Basically all of what was said under II.A therefore also applies to this section. Particularly noteworthy are the links that were established together with COST Actions IC0602 and IC0801 through the organization of a spring school that is supported by all three actions (more information can be found at <http://www.cost-ic0702.org/springschool/>). Possibilities to extend and strengthen these connections will be explored during the COST Annual Progress Conference in Santander (Spain), June 6-8, 2009, where the Chairs of these COST Actions plan to take the opportunity to meet and discuss future collaborations.

III.C. New networking

Up to now, the Action has brought together a total of 48 researchers from different backgrounds and has triggered a lively exchange between them. They come from 18 countries and include 7 women (15%). (This number does not include the four female early stage researchers executing short-term scientific missions, see below).

The Action started with 10 countries signing the MoU and has now 17 countries. Furthermore, we expect to have a new country (Bulgaria) joining the Action in the following months. Furthermore, we started with 14 initial WG members and we have now 48 members of WGs actively participating in the meetings we have organised.

In the COST year 2008/2009 a total of nine STSMs have been approved. Eight of these STSMs were/will be carried out by early stage researchers, four of which are women.

- **STSM-COST-IC0702-0801** (period: 13.04.-24.04.2009)
Visitor: Mr Az Azrinudin Alidin (early stage researcher), University of Lugano, Switzerland
Host: Prof. David Losada, University of Santiago de Compostela, Spain
- **STSM-COST-IC0702-0802** (period: 08.06.-13.06.2009)
Visitor: Prof. Fabio Crestani, University of Lugano, Switzerland
Host: Prof. Fazli Can, Bilkent University, Turkey
- **STSM-COST-IC0702-0803** (period: 04.05.-15.05.2009)
Visitor: Ms Shima Gerani (early stage researcher), University of Lugano, Switzerland
Host: Prof. Maatern De Rijke, University of Amsterdam, Netherlands

- **STSM-COST-IC0702-0804** (period: 23.03.-23.04.2009)
 Visitor: Ms Ana Belen Ramos-Guajardo (early stage researcher),
 European Centre for Soft Computing, Mieres, Spain
 Host: Prof. Thierry Denoeux, Université Technologie de Compiègne, France
- **STSM-COST-IC0702-0805** (period: 07.01.-07.02.2009)
 Visitor: Mr Antonio Balzanella (early stage researcher),
 University of Naples "Federico II", Italy
 Host: Dr. Yves Lechevallier, INRIA-Rocquencourt, France
- **STSM-COST-IC0702-0806** (period: 01.03.-31.03.2009)
 Visitor: Ms Maria Brigida Ferraro (early stage researcher),
 University of Rome "La Sapienza", Italy
 Host: Dr. Gil Gonzalez-Rodriguez, European Centre for Soft Computing, Mieres, Spain
- **STSM-COST-IC0702-0807** (period: 23.05.-25.06.2009)
 Visitor: Dr. Bülent Tütmez (early stage researcher), Inonu University, Turkey
 Host: Prof. Edzer Pebesma, University of Münster, Germany
- **STSM-COST-IC0702-0808** (period: 10.05.-10.06.2009)
 Visitor: Ms Katharina Tschumitschew (early stage researcher),
 University of Applied Sciences Braunschweig/Wolfenbüttel, Germany
 Host: Dr. Detlef Nauck, British Telecom Intelligent Systems Research Center,
 Ipswich, United Kingdom
- **STSM-COST-IC0702-0901** (period: 24.05.-15.06.2009)
 Visitor: Dr. Giorgio Luciano (early stage researcher), University of Genova, Italy
 Host: Prof. Tormod Næs, Oslo University, Norway

From those STSMs that were already completed at the time of this writing and for which scientific reports have been delivered, drafts of research papers are already available. These papers will be completed and submitted to conference and journals in the course of the year 2009.

In addition to the STSMs, early stage researchers are targeted by the spring school on "Reasoning and Decision Making under Uncertainty and Imprecision", which the Action organized in cooperation with COST Actions IC0602 and IC0801 on May 18-20, 2009, at the European Centre for Soft Computing, Mieres, Spain (more information can be found at <http://www.cost-ic0702.org/springschool/>). In addition, a summer course "Soft Computing and Statistics" has been organized in conjunction with the 2009 Fuzzy Systems Association World Congress (IFSA 2009) and the 2009 Conference of the European Society for Fuzzy Logic and Technology, to be held on July 17-20, 2009, at the Technical University of Lisbon, Portugal (more information can be found at <http://www.cost-ic0702.org/summercourse/>).

III.D. Self evaluation

Even though it was expected that due to the highly inter-disciplinary nature of the COST Action it would not be easy to persuade people from different backgrounds to work together, this proved to be an even more serious challenge. Even within each domain (statistics and soft computing) and work group, it took several meetings to convey a sufficiently clear idea of the individual research areas the participants are working in. As a consequence, our expectations to start working on project proposals (EU or other) within the first year proved to be unrealistic. However, some progress in this direction has been made and a subgroup of work group C has been formed, which is now actively pursuing the goal to prepare an FP7 project proposal. Nevertheless it will likely still take some time before it is matured enough to be submitted.

Despite these problems, the scientific exchange between work group members that was triggered and sustained at the meetings in Neuchâtel (Switzerland), June 19-20, 2008 (in conjunction with the ERCIM conference), Warsaw (Poland), October 20-21, 2008, and Palma de Mallorca (Spain), March 16-17, 2009, was very fruitful, and resulted lively and animated discussions, which everyone was eager to continue in future meetings.

Motivating enough people to consider going on a short-term scientific mission also proved to be less easy than we had hoped. It took some time before first applications were submitted and could be evaluated. Nevertheless, by repeated advertising among the work group members of the action, we finally managed to fall only one short of the envisioned number of 10 STSMs in the first year (9 STSMs were carried out or are scheduled and will be completed in the COST year

2008/2009). We hope that in the future, once such a start has been made, it will become easier to encourage enough people to go on a short-term scientific mission.

From those short-term scientific missions that have already been completed at the time of writing of this report and for which the scientific reports are therefore already available, we see that a fruitful exchange has been stimulated. These STSMs led to drafts of scientific papers which, in the course of this year, will be completed and submitted to conferences or journals.