**eunite**

The European Network on Intelligent Technologies
for Smart Adaptive Systems

# Executive Summery Report

# Technology Transfer Committee

*Submitted by committee chair Jens Strackeljan, 03.06.2004*

*Reporting Period: 01.01.2001- 31.06.2004*

Actions mentioned in Annex I (1-5)

## 1) Patent Service

The actual discussion about software patents in the EC and the fact that more than 17,000 European Patents on „software related inventions" were granted -most of them held by non European global players from the US or Japan- it is necessary to support small and mid size European companies in this important field. Many of them are high technology oriented using soft computing technologies for software developments or related applications, but don't have enough information and legal advice in the patentability of software inventions under national and European law. As a part of the Technology Transfer activities EUNITE have established an information exchange by setting up  an internet portal with patent guidelines, examples of commented soft computing patents and with the support of a patent attorney an individual free of charge first advice for interested companies and developers.

Achievements:

Using as an indicator a couple of very stimulating discussions during workshops and the general assembly of one EUNITE conference this TTC activity was an interesting offer for the EUNITE nodes. The main function of patents is to protect inventions. To do this, they must be published and made available to the public. However, not only do patents contain solutions to technical problems, they also represent an almost inexhaustible source of information. The patent service portal make this information more transparent for the research areas which where covered by EUNITE. A crucial point in each technical or legal assistance concerning patent questions is the problem the nondisclosure. In spite of the guarantee that all information will be handled confidential and that there are no financial risk or duties the members are afraid to use the first advice. That is no argument to stop that activities but to find new ways for the promotion  to overcome existing hurdles. The European paradox is still present. Europe's scientific productivity is very high but it does not find the way to the market. The EU lags far behind its competitors in terms of inventiveness (patents per population). Therefore we have to state a strong need for transforming research results into viable innovations.

## 2) Competition Series

The EUNITE international open competition focuses on bench-marking competitive techniques like fuzzy logic, neural networks and advanced mathematical statistics and on demonstrating the efficiency of these disciplines in addressing real-world issues. In total three competitions with different tasks were organised from 2001 to 2003.

Competition 2001:

The first competition in the framework of EUNITE was announced with the title: 'Intelligent technologies for load forecast in Eastern-Slovakia'. The problem to be solved is the forecasting of maximum daily electrical load based on electrical load values and additional data. We had in total 56 registrations from 21 countries. During the competition the web page has been visited 2500 times. Finally 15 participants submitted 18 solutions based on a wide variety of creative approaches.

Winners 2001:
1. Chih-Jen LIN, Dept. of Computer Science, National Taiwan Univ. TW
2. David ESP, National Grid UK
3. Werner BROCKMANN, Institute of Computer Engineering, Med. Univ. Lübeck, Germany

Competition 2002:
The second competition in the framework of EUNITE has the topic Modelling the Bank's Client behaviour using Intelligent Technologies' .In total 143 people from 33 countries registered and downloaded the data and at least 15 participants sent there results and a report.

Winners 2002:
1. Marcin Wojnarski , Institute of Informatics, University of Warsaw (Poland)
2. Gama University of Porto (Portugal)
3. Davis Esp National Grid (UK).

**Competition 2003:**
The problem posed in 2003 involved modelling of the temperature variation in the melting tank (Schott Glas, Germany) of a glass furnace on the basis of process variables. The special challenge presented by this problem involves the long delay times between the change in a control variable and the change in temperature at the outlet from the melting tank.
In total 56 people registered and downloaded the data. A total of twenty proposed solutions were received, some of them from the United States and Brazil, among other countries

Winners 2003
1. Marcin Wojnarski, University of Warsaw, Poland
2. Bernhard Pfahringer, Waikato University in New Zealand
3. Dumitru-Iulian Nastac and Adrain Costea, Computer Science Centre in Turku, Finland

As an expression of its gratitude, Schott Glas awarded prizes in the amounts of 5000 € (1st place), 3000 € (2nd place), and 1000 € (3rd place). "

For all competitions TTC organised an open workshop during the annual symposium to give the winners of the competition the change to present their solutions.

Competition Working Team 2003/4:
EUNITE is a Network of Excellence. Consequently, those who actively co-operate in such a network, and of course the EC as the source of financial support, have a special interest in quantifying excellence in particular fields. The solution of this problem is not easy, but it should be borne in mind in the course of activities within the network. Of course, the solutions presented by the winners of a competition are certainly good, or at least better than those offered by the other participants. However, does this suffice for being considered as excellent? After all, it is often difficult to classify a solution. Scientific developments in the field of intelligent technology occur so fast that an individual person is hardly capable of achieving excellence as an expert in all areas. Hence, what could be more logical than the attempt to combine good detail solutions in such a way that an improvement can finally be achieved? For this purpose, we have established a competition team in which about eight participants have continued their intensive work with the data of the 2003 competition. Each member of the team has to contribute ideas, deliver new results or share parts of his algorithms or methods to improve the results which has been obtained in June 2003. The competition working team (CWT) will improve the current results of the competition by a joined research activity.
I n total we have organised three CWT Workshops:

OULU 13th of July 2003 (14 Participants),
Mainz 20th til 23th of November 2003. (9 Participants),
Aachen 12th til 13th of June 2004. (10 Participants).

Achievements:
Without any doubt we can say that the EUNITE Competition series has been a success. This

instrument has increased the publicity of the network. All competition workshops were well attended (20-30 participants). In general we got a very positive feedback from all participants. The results of the competitions were published in booklets and on the internet. Each problem task has been a real world problem. The 2003 competition was funded by a company because they saw from previous competitions the potential benefit to get different solution for an identical problem task. The organisation of a competition which should lead to reasonable results is a tricky task. A definition of an understandable real world problem, a definition of an evaluation criteria and a strong focus on adaptivity should not be underestimated. To improve the general management of competitions we wished to know whether the knowledge of and the background information on the process (for the 2003 problem) are of central importance for success. If this is the case, competitions in which only superficial information on the technical background is provided will always present problems of a fundamental nature. Even if a general answer is not possible, it can be concluded that background information (CWT- Team has done an excursion to a glass melt) was helpful, but not necessary, for a useful and qualified consideration of the problem. Such competitions could spread Excellence and foster Technology Transfer in to ways. Inside the network and external due to the exemplarity of a problem solution.

The multidisciplinary formation of the CWT Team led to solutions which could not be obtained by a sole processing by individual specialists. In opposite to long or middle term research exchange programmes a team will handle the given task in a mix of very few joint short dated workshops and a following close co-operation where the communication will be managed via electronic media. By using a team competition two important objective of EUNITE could be achieved. The work on a an identical problem task allows the comparison of different techniques and will lead to best practise guidelines and standardisation. The competitive character could improve the quality of the solution and assure the high quality (excellence) of the integrated activity.

As a conclusion TTC have to answer the question: Have the activities conducted in the course of the team competition been worthwhile? The answer should be a definite "yes", even though the organisers had wished for even more team work. However, the exchange of ideas and the associated discussions have certainly resulted in changes as well as decided improvements in many respects. A quantification of these results is possible. The results of the CWT are published in an extensive summery of all reports, papers which were produced in the framework of the CWT. We have demonstrated that a team of motivated specialists are indeed capable of solving problems and of producing excellent results. In these sense the CWT is a promising instrument to foster internal (inside the network) and external Technology transfer and we like to continue with these kind of team competition in a comparable framework.

## 3) Workshops

Beside the competition activities the TTC committee has organised other Workshop

1. Workshop on Technology Transfer in Lilafured (June 2002)
in cooperation with the University of Miskolc, Hungary, and the TU Košice, Slovakia, an workshop "International Workshop devoted to problems of technology transfer of Intelligent Solutions into Technology( ISIT 2002). The objective of the meeting was to encourage the discussion between Academia and Industry in problems of implementation intelligent solutions in real world industry. The workshop tried to bring together companies and international experts - most of them from Japan- in the field of intelligent technologies and to discuss existing gaps and bridges to speed up the technology transfer between academia and industry and vice-versa. The two days workshop had some from academia and industry which gave oral presentations and a round table discussion. 20 to 25 people in the audience listened to the oral presentations of the invited speakers and took an active part in the panel discussion during the two days workshop.

2. TTC has participated and organised the Kickoff meeting for the task Task Force Safety Critical Systems and a workshop about 'Safety critical aspects in adaptive systems'. Reports about this activities are available in the EUNITE database.

Achievements:
A workshop is the classical instrument to improve networking. The success depends from a couple of

factors. An very interesting topic is no guarantee for a large number of participants if the choice of the location is not ideal. The Lilafured workshop has shown that only a couple of representations from the local industry use the change to get more information about new developments and ideas in Japanese technology transfer in the area of intelligent technologies. Due to financial aspects we have to join the workshop with an international conference and therefor the location was given. But the benefit of that events could not be measured only by the number of participants. The workshop was a success because it had a high quality and it help to bring together the old and new EU members and researchers from Japan. Methods of technology transfer could not be transferred with adjustment but European countries could learn a lot. In Japan the average spending in RTD is significantly higher than in Europe. EU states show excellent scientific performance but the commercial performance is much lower if compared with Japan (measurement index number of patents / population).

## 4) Best practise guide

Among other committees TTC was responsible to produce a best practise guideline for smart adaptive system. It was clear from the beginning that this guideline should not be the result of a small group of members but a common consensus which covers most of the IBA's and RTD areas. To motivate member to contribute we decided to start a book project. With the title "Do smart adaptive systems exist? Best practice for selection and combination of intelligent methods" members of EUNITE will publish a book (Springer).

Achievements:
The book is intended as a reference and a guide summarising and focusing on best practices when using intelligent techniques and building systems requiring a degree of adaptation and intelligence. It is therefore not intended as a collection of the most recent research results but a practical guide for experts from other areas and industrial users who are interested in building solutions to their problems using intelligent techniques. One of the main issues covered is an attempt to answer the question of how to select and/or combine suitable intelligent techniques from a large pool of potential solutions. The book brings together experts from neural network, fuzzy, machine learning, evolutionary and hybrid systems communities who will provide their views on how these different intelligent technologies have contributed and will contribute to creation of smart adaptive systems of the future.
An integration of these communities has been one of the main goals of (EUNITE). Over two years of various EUNITE activities focusing on issues of adaptation and intelligent behaviour of computing and engineering systems has also led to posing the question which is the title of this book: Do smart adaptive systems exist? The book will be published in 2004.