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AComIn:
Advanced Computing for Innovation

FP7 Capacity Programme
Research Potential of Convergence Regions

D 3.2
Networking – Month 36

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EXECUTIVE SUMMARY

Networking activities aim at the strengthening of the IICT research and innovation capacity by increasing the knowledge and skills of the experienced IICT researchers. The Work Package 3 (WP3) of AComIn organises several types of networking activities in the following Tasks defined in the project Technical Annex:

- TASK 3.1: Networking with the partnering organisations (by exchange of secondments and short visits);
- TASK 3.2: Attending conferences, exhibitions, information and training events in the EU.

Twelve outgoing secondments to partnering sites, each with duration of one month, were implemented in project months 19-36 (out of 12 secondments planned with average duration of 2 months). One incoming secondment with duration of one month was implemented (out of 6 incoming secondments planned with average duration of 2 months). Three papers reporting about the secondment results were prepared and submitted to the International conference AComIn-2015 that will take place in November 2015 in Sofia.

Regarding the short visits (two way exchange with leading EU Centres) AComIn organised in WP3:

- 18 incoming short visits of scientists from 10 countries, 5 of them visits of AComIn partners. During their visits they prepared joint papers, gave lectures at IICT seminars and participated in the AComIn Doors Open Days. Some 10 lectures were delivered at AComIn seminars;
- 16 outgoing short visits of IICT experienced scientists were implemented to 6 countries, 13 of them to project partners. Three joint papers were prepared during these visits, 9 talks were given.

During AComIn months 19-36, some 33 experienced researchers participated in 43 international scientific events (42 of them peer-reviewed conferences and workshops, one – a project-related workshop). In total, these researchers gave 66 presentations. As result, 52 peer reviewed papers were published in the respective event Proceedings. Please note that AComIn experienced researchers attend conferences without presentation of accepted papers quite rarely, as an exception only, with a decision of the AComIn Executive Board.

Attending information events in the EU is considered by the AComIn team as an extremely important activity as it enables the IICT seniors to establish new useful contacts, to build new consortia, to consolidate already existing working contacts and – last but not least – to promote AComIn and its achievements. 4 visits of IICT experienced researchers to 3 events have been implemented.

The AComIn Executive Board created a standardised procedure for implementation of WP3 mobilities. It includes obligatory delivery of final reports that arew uploaded at the project site, together with detailed information about the respective event or mobility purpose. In the Team Area under *Reports - WP3* there are pages for each type of mobilities. Some print-screens are included here in the relevant sections as illustrations.

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Summary	This report presents the result of networking activities performed during the second period (months 19-36) in the project AComIn. Three kinds of networking activities are described: *(i)* networking with the partnering organisations, *(ii)* networking by attending international conferences with accepted papers as well as exhibitions with stands and demonstrators, and *(iii)* attending contact building events like the EC Information days etc. The Added Value of the networking activities is assessed. D3.2 discusses also the deviations from schedule.
Keywords	Networking, secondments, short visits, invited talks, conferences, exhibitions, information events, added value

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1 INTRODUCTION

Networking activities aim at the strengthening of the IICT research and innovation capacity by increasing the knowledge and skills of the experienced IICT researchers. The Work Package 3 (WP3) of AComIn organises several types of networking activities in the following Tasks defined in the project Technical Annex:

TASK 3.1: Networking with the partnering organisations:

- Organisation of secondments in months 19-36: 1 outgoing and 1 incoming per each partner, each secondment with duration of 2 months.
  The organisation of these 12 secondments includes coordination of research and travel plans with the partners, writing Work Plans for each secondment, organisation of Reports after the return of the visitor and Assessment of the secondment Added Value. We note that only the experienced researchers are eligible for secondments.
- Organisation of short two-way visits with the partnering teams: for (i) coordination of the joint work, (ii) exchange of expertise, results and best practices, (iii) invited lectures and report of results at seminars, (iv) writing joint scientific books (or books chapters) with the partners, (v) lecturing at User Communities seminars, (vi) meeting with business representatives to accelerate the process of transferring the recent achievements of IICT and the partners to real-life applications.

Secondments are defined as "*detachments of persons from their regular organisation for temporary assignment elsewhere*".

TASK 3.2 (month 1-36): Attending conferences, exhibitions, information and training events in the EU comprises the following activities:

- Organisation of short travels for attending prestigious International Conferences with accepted peer-review papers;
- Organisation of short travels for attending International Fairs and Exhibitions to demonstrate AComIn results;
- Organisation of short travels for attending Information Events related to the Community RTD Funding Programmes;
- Organisation of short travels for attending international training events oriented to industrial ICT RTD and take-ups in areas related to applications of the Smart Lab Devices;
- Organisation of short travels for attending international training events in Innovation Policy and IPR issues.

This deliverable overviews the AComIn Networking activities in months 19-36. According to the Technical Annex, participation in events needs to be reported together with the event programme, participant list and presentation given by the IICT researchers for each attended event. Detailed reports about Networking are stored in the Team area of AComIn site (www.iict.bas.bg/acomin) under REPORTS, WP3. Here we summarise various networking activities with focus on the results and their Added Value for strengthening the research potential of IICT.

2 SECONDMENTS

Secondments are planned so as to enable the specialisation and training of the experienced IICT researchers at the partnering organisations, esp. regarding technologies related to the use of the Smart Lab devices and in order to initiate new joint research activities. Secondments are also viewed as an opportunity to support IICT scientists in establishing links with innovation absorbing industrial organisations and Users from the Public sector, by understanding the approach of the AComIn partners and adapting it to the IICT needs. Figure 1 shows the page in the Team Area where information about the Secondments is stored, under *Reports, WP3 Mobilities – Secondments*.

Twelve outgoing secondments to partnering sites were organised, each with duration about one month:

- three secondments to the University of Örebro, Sweden, in the period 15 May – 15 June 2014: Assoc. Prof. Lyubka Doukovska, Assoc. Prof. Vladimir Monov and Dr. Vassia Atanassova;
- two secondments to the Vrije University of Amsterdam, member of STI International, in the period 30 June - 31 July 2014: Assoc. Prof. Kiril Simov and Assoc. Prof. Petya Osenova;
- one secondment to the University of Duisburg – Essen, Germany, in the period 1-28 September 2014: Dr Maria Lymbery;

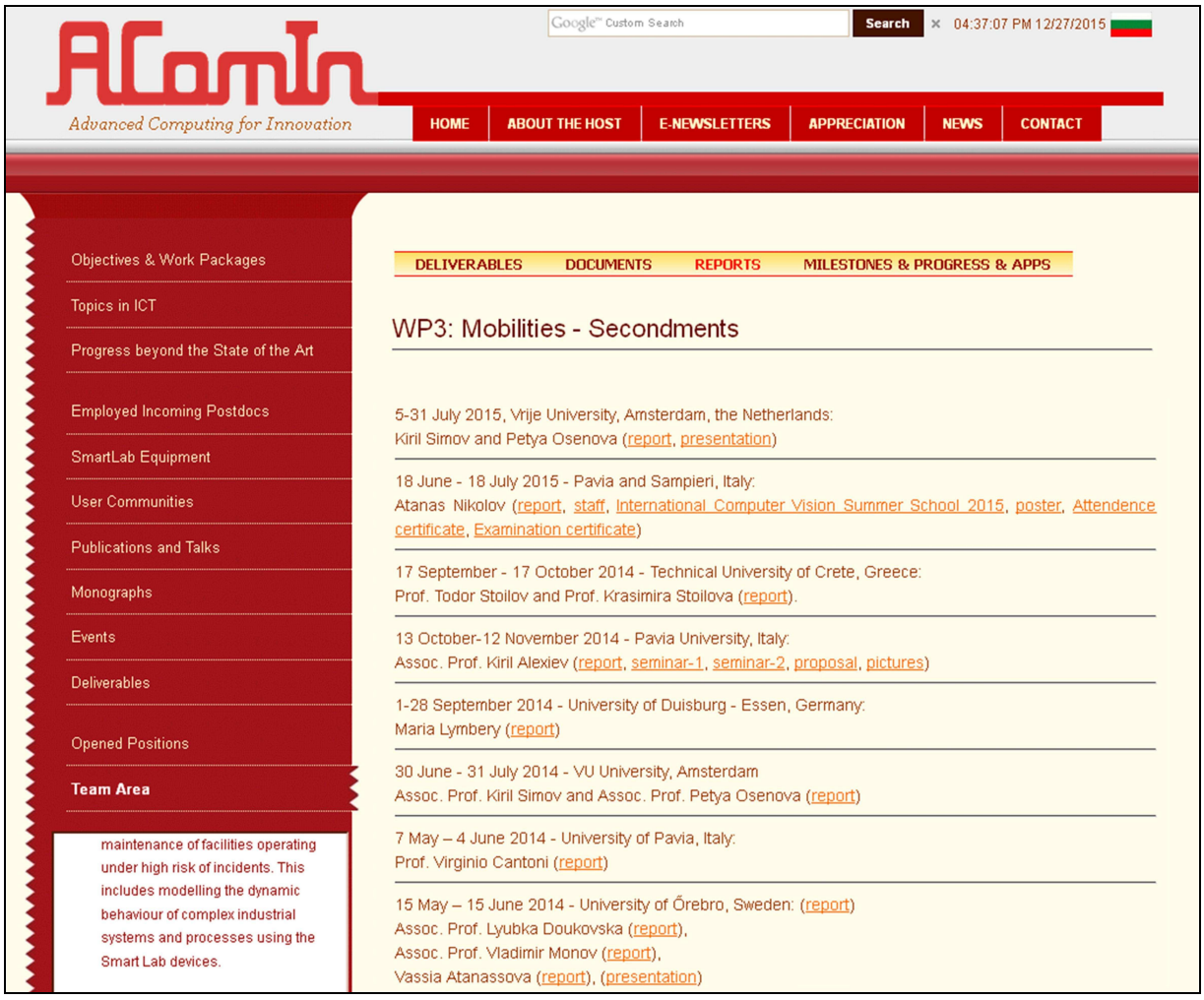

Figure 1. Storing information about 12 outgoing and one incoming Secondments in the Team Area

- one secondment to the University of Pavia, Italy, in the period 13 October-12 November 2014: Assoc. Prof. Kiril Alexiev;
- two secondments to the Technical University of Crete, Greece, in the period 17 September - 17 October 2014: Prof. Todor Stoilov and Prof. Krasimira Stoilova;
- one secondment to the University of Pavia, Italy, in the period 18 June - 18 July 2015: Atanas Nikolov (young researcher who is in the procees of delivering his PhD thesis);
- two secondments to the Vrije University of Amsterdam, member of STI International, in the period 5-31 July 2015: Assoc. Prof. Kiril Simov and Assoc. Prof. Petya Osenova.

During the period of 15 May –16 June 2014, *Assoc*. *Prof. Lyubka Dukovska, Prof. Vladimir Monov* and *Dr. Vassia Atanassova* from IICT-BAS visited the School of Science and Technology and the Centre for Applied and Autonomous Sensor Systems at the University of Örebro, Sweden. During their stay they conducted joint research with their Sweden colleagues on some optimisation and intelligent control topics. The results of this research were published in a paper: Atanassova V., L. Doukovska, D. Karastoyanov, František Čapkovič. *InterCriteria Decision Making Approach to EU Member States Competitiveness Analysis: Trend Analysis*, presented at the 7th IEEE International Conference Intelligent Systems - IS'14, September 24–26, 2014, Warsaw, Poland. They also discussed possibilities to use the specialised software package EDEM purchased in the frame of the AComIn project, for modelling the processes of production, transportation and usage of granular materials. At a seminar of the School of Science and Technology, Dr. Atanassova presented a lecture entitled "*InterCriteria Decision Making using Intuitionistic Fuzzy Sets*".

From 30 June to 31 July 2014 *Assoc. Prof Kiril Simov* and *Assoc. Prof. Petia Osenova* from IICT-BAS visited the Faculty of Arts at the Vrije University of Amsterdam. The visit had two main tasks: 1) to complete and release the first Bulgarian Core WordNet; and 2) to adapt the Bulgarian NLP pipe for processing of big amounts of texts in currently used standards, as NAF, and to enrich it with modules for semantic annotation. The first task was performed in close cooperation with the group of Prof. Piek Vossen (the Head of the Computational Lexicology and Terminology Lab) and with Prof. Francis Bond (from the Singapore University), who was a visiting fellow in the Vrije University of Amsterdam. At the moment the Bulgarian Core Wordnet is freely available (http://compling.hss.ntu.edu.sg/omw/). The second task was also performed in close cooperation with Prof. Piek Vossen's group. The pipe was adapted to process big data in NAF format and incorporates the available WordNet senses. The pipe for Bulgarian was included in the EU 7FP project *NewsReader: Building structured event Indexes of large volumes of financial and economic Data for Decision Making*.

Dr. Maria Lymbery from IICT-BAS visited the University of Duisburg-Essen, Essen, Germany in the period 1–28 September 2014. The main objective of her visit was conducting a joint research with Prof. Johannes Kraus. During this visit in Essen a preconditioning technique known as incomplete factorization by local exact factorization (ILUE) was studied analytically and numerically. A technique for constructing ILUE preconditioner based on splitting of the domain into overlapping and/or non-overlapping subdomains was proposed and a condition number estimate was derived. The scientific results obtained during the visit are presented in a paper entitled "*Incomplete Factorization by Local Exact Factorization (ILUE)*" submitted to a special issue of the "Journal of Mathematics and Computers in Simulation" (Impact Factor: 0.856) devoted to the 80th birthday of the distinguished Professor Owe Axelsson.

In the period 13 October – 12 November 2014 *Assoc. Prof. Kiril Alexiev* visited the Computer Vision and Multimedia Lab in Pavia University, Italy. During his stay he worked on several topics of joint interest, among them 3D scene reconstruction (based on multi-view geometry or using only one

image), eye tracking (based on statistics - detect and analyse - of randomly generated trajectories in each moment of time and on measuring the correlation between this statistics and answers of the examined person), acoustic analysis and modelling as well as development of interactive multimedia applications for the Violin Museum in Cremona. Dr Alexiev gave two presentations on 21 October and 6 November 2014 for PhD students and the Lab staff. Along with Prof. Virginio Cantoni, Dr Alexiev prepared a proposal for collaboration and joint research in the field of 3D scene and object restoration between the Mathematical Methods for Sensor Data Processing Department of IICT-BAS and the Computer Vision and Multimedia Lab in Pavia University.

From 17 September to 17 October 2014 *Prof. Todor Stoilov* and *Prof. Krasimira Stoilova* visited the Dynamic Systems and Simulation Laboratory (DSSL) of the Technical University of Crete, Greece. The main goal of the visit was to perform joint research on problems of control in transportation systems. During their stay Prof. Stoilov and Prof. Stoilova evaluated the METANET model for ramp metering control on highways. They had been acquainted with the experience of the Greek partners about their work with the Transport Department of the Municipality of Chania. The Greek colleagues expressed their concerns about the difficulties of implementing new control strategies in freeway transport control. Because of the specific city infrastructure and the enormous number of tourists the practical results of the control policies were not always satisfactory. On 1 October 2014, at a DSSL seminar, Prof. Stoilova presented the main research fields of IICT-BAS, the AComIn project, the SmartLab equipment, and the networking scheme within AComIn. Prof. Stoilov gave the lecture“Trough multilevel optimisation to self-optimisation control” which presented ideas how to improve the urban traffic management based on changing the duration of the traffic lights cycles and the relative duration of the green light of some of the streets with the most intensive traffic in Sofia. Prof. Stoilov and Prof. Stoilova plan to prepare a joint paper with Prof. M. Papageorgiou and I. Papamichail on integration of optimisation problems in the traffic control domain.

In the period 18 June – 11 July *Assistant Atanas Nikolov* (who delivered his PhD thesis for evaluation and defense) visited the Computer Vision and Multimedia Lab (CVML) of the University of Pavia, where he conducted research together with Prof. Virginio Cantoni and his group. This research is a continuation of the work related to the seminar on Biometrics (BIOMET’14) in the area of Ear Recognition. In particular, the following was done: *(i)* analysis of the newest achieved results in the area of Ear recognition, as well as the state of current available Ear Databases, based on IEEE papers, PhD theses and books form the recent years (2012-2015); *(ii)* analysis of different types of ears representations in the forthcoming for publishing Ear Database, containing 100 basic 3D models of human ears (with their corresponding video clips), collected by the 3D laser scanner of AComIn Smart Lab in June 2015. The analysis also included: selecting the optimal methodology for post-processing of 3D ear models, as well as generating of derivative representations from 3D ears, as 2D intensity projections and 3D range (depth) images; design of simple structure of awebsite for database access, as well as consideration the content of license agreement for DB usage; (iii) establishing contacts with the Biometric and Image Processing Laboratory in Salerno for preparing a joint paper, concerning the collected at IICT Database of 3D ears for the AComIn conference in November 2015. Dr Nikolov confirms the the presence of great interest by CVML for joint cooperation in Ear Biometrics especially using the 3D laser scanner in AComIn Smart Lab for creating 3D models of human ears with great accuracy.

From 5 to 31 July 2015 *Assoc. Prof. Kiril Simov* and *Assoc. Prof. Petia Osenova* from IICT-BAS visited the Faculty of Arts at the Vrije University of Amsterdam, esp. the group of Prof. Piek Vossen (the Head of the Computational Lexicology and Terminology Lab). During their stay they worked on the following activities: *(i)* WordNet development: cleaning and validation of the enriched BulTreeBank WordNet for the next release (almost done); evaluation of automatic extension of WordNet mapping for Bulgarian,

using our Core WordNet and Wikipedia and ImegaWiki. The automatic mappings were done by Antoni Oliver Gonzalez, Estudis d'Arts i Humanitats, Universitat Oberta de Catalunya. He was also visiting Vrije Univerisiteit and developed his own tool for this purpose. (ii) Working on Word Sense Disambiguation task. Both goups IICT-BAS and VU use the knowledge-graph tool UKB, developed by the IXA group, Basque country. Experiments have been done with Bulgarian (BulTreeBank) and English data (SemCor). The results show improvement when syntactic relations are added for both languages. *(iii)* Semantic Role Labeling: a first automatic transfer of Predicate Matrix was performed on Bulgarian data – Setimes. The transfer showed several directions for improvement: 1. Unification of lemmas across Bulgarian resources; 2. Using bilingual English - Bulgarian dictionary and aligned corpora; 3. Using dependency parses for assignment of the semantic roles; 4. Annotation of big corpora. The results obtained during the visit will be described in a paper submitted to the conference AComIn-2015 held in November 2015 in Sofia.

There was one incoming secondment: In the period 7–23 May and 22 June – 4 July 2014 IICT-BAS was visited by *Prof. Virginio Cantoni* from the University of Pavia, Italy. During his stay Prof. Cantoni conducted collaborative research with Prof. Dimov from IICT-BAS on the creation of a database with 3D images of human ears for biometrics purposes. The images were created using the 3D Scanner of AComIn Smart Lab. The results of this research were presented in two joint papers: Virginio Cantoni, Dimo T. Dimov, and Atanas Nikolov. "*3D Ear Analysis by an EGI Representation"* and Dimo T. Dimov and Virginio Cantoni. "*Appearance-Based 3D Object Approach to Human Ears Recognition"*, that were presented at BIOMET'2014 workshop held in Sofia, June 23-24, 2014. The proceeding of the workshop was published as a Special Volume in the series Lecture Notes in Computer Science by Springer Publ. house. As a program chair Prof. Cantoni together with Prof. Dimov prepared and successfully carried out the BIOMET'2014 workshop. Prof. Cantoni also took part in the 15th edition of the International Conference CompSysTech, where on June 27, 2014 he gave the invited lecture "*Eye-tracking systems, research and applications*".

3 SHORT VISITS AND EXCHANGE BETWEEN IICT AND EU CENTERS

The visits (both incoming and outgoing) were aimed at exchanging and sharing research results and experience as well as discussing the challenges and adopted solutions in accomplishing the main objectives of AComIn.

3.1 Incoming short visits

During the second project period 18 short incoming visits were organised. Scientists from Austria, Germany, Scotland, Japan, USA, Italy, Holland, Croatia, FYROM and Romania visited IICT. During their visits they prepared joint papers with the IICT researchers and gave lectures at IICT seminars. The list of visits and reports about the joint activities can be found in the Team Area, under Reports, WP3 Mobilities: Incomming Short Visits.

Prof. Siegfried Selberherr (Institute for Microelectronics of the Technische Universität Wien) was a guest lecturer in AComIn in the period 29 April - 2 May 2014. He had several meetings with the ACOMIN coordinator, work package leaders and collaborators, concerning organisation of the activities, novel trends and open research problems raised by the progress of nanoelectronics. The visit programme also comprised meetings, a seminar and discussions concerning the completion of several joint papers, future research objectives and management of the collaboration. In particular the discussions focused on an actual research problem related to the existence and uniqueness of the

solution of the Wigner equation describing posed by the boundary conditions (conditions in the contacts) quantum transport in nanoelectronic devices. The problem remains open in the literature since several years. A particular result has been derived and a plan for its dissemination has been elaborated.

Prof. Oleg Iliev (Fraunhofer Institute of Industrial Mathematics ITWM, Kaiserslautern, Germany – a project partner) visited IICT, BAS in the period 17-22 May 2014. During this short visit some problems of a common research interest were discussed. They support the implementation of Advanced Computing agenda of AComIn. The experience of ITWM with application and analysis of CT voxel data was of a particular focus. The discussions include some specific information concerning the functionalities of GeoDict software. Prof. Iliev took part in the International Conference on Numerical Methods for Scientific Computations and Advanced Applications, Bansko, 19-22 May, organised by IICT, where he presented a plenary invited talk entaitled Upscaling Based Preconditioners for Composite Materials.

Prof. Hermann Rohling (Institute of Telecommunications at Hamburg University of Technology, Hamburg, Germany) was on a short visit to IICT in the period 18-25 May 2014 concerning a possible collaboration within the framework of the AComIn project. During this visit some problems of a common research interest were discussed. They are within the implementation of Advanced Computing agenda of AComIn. He presented a lecture entitled “Automotive Radar Systems”, which caused fruitful discussions and raised interest in further deepening the research contacts. Some joint activities for the last AComIn year were discussed.

Dr. Campbell Millar (Gold Standard Simulations Ltd. Glasgow – a project partner), was part of the IICT for the duration 11-14 June 2014 when jointly with IICT researchers a proposal for efficient techniques and tools for NANOoelectronic devices SIMulation were discussed and future collaboration within AComIn year 3 was planned.

Prof. Asen Asenov (University of Glasgow – a project partner) had a short visit to IICT in the period 11-17 June 2014. Asen Asenov and Ivan Dimov presented the current status of the collaborations and the progress in regards to the joint research developments initiated with the visit of Dr. Salvatore Amoroso. Plans for submission of a joined project on advanced quantum modeling of nanoelectronic devices were discussed. Assen Asenov and Campbell Millar visited two research gorups and were thoroughly informed about the research capabilities and the active research project. This information will be disseminated in the School of Engineering of University of Glasgow to foster future collaboration in Horizon 2020 proposal. Asen Asenov gave an interview about the role and the potential of AComIn for the research development of IICT and the enhancement of the European collaborations for a film dedicated to AComin.

Prof. Dr. Ken’ichi Yano (Mechatronics Laboratory and Dean of Mechanical Engineering Department at MIE University – Japan) was on a short visit at IICT for the 17-21 September 2014 time frame. He participated at the AComIn Transfer Technology Seminar on Robotics and Innovations held on September 18-19, 2014 in IICT-BAS. At this seminar Prof. YANO gave 4 lectures on robotics and innovations; computation methods, simulations and control of industrial robots; development of human-robot interaction interface as well as design, development and control of medical, rehabilitation and human support robots. Also, he explained the base stages to develop innovative robots and control algorithms and how to implement them to industry and hospitals. During his visit Prof. YANO was shown the Smart Lab equipment.

Prof. Raytcho Lazarov (Texas A&M University, College Station, USA) was part of a short visit in the period 2-15 February 2015 to continue a joint research effort in the area of development, study, analysis and implementation of preconditioners for systems arising in FEM approximation of second order elliptic problems, describing processes in highly heterogeneous media. During his visit he took part in the organisation of a special session on "Numerical Methods for Multiphysics Problems" at the 10th Int. Conference "Large Scale Scientific Computing" (LSSC'15), Sozopol, 8-12 June 2015. The event is included in the planned AComIn activities of WP5 "Dissemination". The aim of this Special Session is to bring together researchers working in the area of large scale simulation and computations of coupled processes of different physics and different scales in space and in time. The challenges to be addressed are related to both approximation techniques (including multiscale methods) and solution algorithms that are robust with respect to the underlining parameters and scales.

Prof. Virginio Cantoni (University of Pavia) visited IICT in the period 18-21 February 2015. The planned collaboration concerns the restoration of the cultural heritage, in particular the restoration of the Battle of Pavia in 1525. The visit was part of an intention to use the technical equipment, bought in the frame of the project AComIn, mainly the 3D printer, for the creation of this model in a joint scientific collaboration. Prof. Cantoni had several meetings with the project participants and presented his first ideas and drafts of 3D-historical images. The project participants will assist in processing these 3D-images, modify them and make them fit the software of the 3D-printer (a part of the SmartLab equipment). Some problems connected with the processing were discussed and some test models were 3D printed.

Prof. Otto Spaniol (University of Aachen, Germany) visited IICT for the duration 20-24 February 2015 as an invited lecturer. Prof. Spaniol had meetings with the project participants and presented a report on Security in Communication Networks: Technical and Nontechnical Issues.

Prof. Ivan Petrović (University of Zagreb, Faculty of Electrical Engineering and Computing, Department of Control and Computer Engineering, Zagreb, Croatia) visited IICT in the period 16-19 April 2015 concerning the participation in the Door Open Days – an event organised in the frames of the project AComIn. He gave a lecture "Autonomous Navigation of Mobile Robots in Unknown and Dynamic Environments" that included a brief overview of recent research activities and achievements of his research group on autonomous mobile robots navigation. The emphasis was given on his recently developed algorithms for real-time motion planning and control, active SLAM for complete model building as well as moving objects detection and tracking. Recent developments on autonomous navigation of aerial vehicles was also briefly presented.

Dr Roxana Radvan and **Dr Dragos Valentin Ene** (National Institute for Research and Development in Optoelectronics, Bucharest, Romania) visited IICT in the period 16-19 April 2015 concerning the participation in the Door Open Days – an event organised in the frames of the project AComIn. **Dr Roxana Radvan** gave a lecture "INOVA-OPTIMA - Optoelectronics in Cultural Heritage", that included a brief overview of recent research activities and achievements of her research group on non-contact optical methods for monitoring monuments conservation status and ecological, non-contact, reversible interventions concerning the restoration and preservation of cultural heritage. The emphasis was given on a modern, recently developed laser techniques for conservation of artworks. **Dr Dragos Ene** gave a lecture "PILOT Project - Platform for Cultural Heritage Transdisciplinary Valorisation", regarding imagistic techniques for investigation of cultural heritage, involving 3D printing, 3D scanning, laser Doppler vibrometry and radar investigations.

Prof. Veno Pacovski from University American College and **Prof. Ivan Chorbev** from St.St. Cyril and Methodius University in Skopie, FYROM visited IICT to attend the Doors Open Days of the AComIn project, 17-18 April 2015. They were familiarised with the achievements in the project with focus on 3D modelling. **Prof. Costin Badica** and **Associate Professor Mihaela Colhon** from the Departament of Computer Science, University of *Craiova*, Romania also attended the Doors Open Days of the AComIn project, 17-18 April 2015, and discussed a possible collaboration via trans-border programmes between Bulgaria and Romania.

Prof. Virginio Cantoni (University of Pavia, Italy – a project partner) visited IICT in the period 16-25 April, 2015 concerning the collaboration between the project AComIn and the University of Pavia. The planned collaboration concerns the restoration of cultural heritage, in particular figures of medieval tapestries dedicated to the Battle of Pavia. Prof. Cantoni is working on this project and one of the tasks is about the creation of a model of the battle as well as tactile matrices for blind people who can feel the contours of the main figures on the tapestries. Problems in printing of the meanwhile developed models were discussed and decisions about the size, colors and transportations were made. It was a very fruitful visit and the main plan about the future collaboration was set. Prof. Cantoni also took part in the Doors Open Days, 17-18 April 2015, IICT - BAS.

3.2 Outgoing short visits

During the project period 16 outgoing short visits of IICT scientists to the partner's institutions and other leading EU centres were organised.

Prof. Galia Angelova, Prof. Ivan Dimov, Prof. Dimitar Karastoyanov and **Prof. Kostadin Kostadinov** visited Glasgow University, UK – a project partner. The visit was held from 22 to 25 April 2014 according to the invitation of Prof. Asen Asenov, GU and Gold Standard Simulation Ltd., a company associated to GU. The main objective of the 2-days visit was to gain impression about the GU approach for working with external clients, making joint projects for industrial research, transferring technologies to industry, offering access to extremely expensive high-tech equipment, as well as to meet representatives of the GU adminsitration who take part in the innovation activities of the University.

Assoc. Prof. Dr. Sc. Mihail Nedjalkov visited Glasgow University, UK – a project partner in the period 5-12 May 2014. The visit was structured in several meetings and seminars, where discussions on the topic of transport of electron in quantum wire, more specifically understanding the mechanisms of decoherence during the phonon scattering, were held. At the seminars Assoc. Prof. Nedjalkov presented existing physical models as well as analysis on their theoretical and numerical aspects in order to choose the most appropriate ones for the existing programming language.

Prof. Dimitar Karastoyanov visited the University of Örebro, Sweden – a project partner, in the period 15-26 May 2014. He had discussions and meetings with Prof. Ivan Kalaykov, Prof. Dimitar Driankov – Reseacrh Director of the Applied Autonomous Sensor Systems Center, and Prof. Anani Ananiev, and got acquiented with the recent achivements and running project of the Centre. The opportunities to start joing developments in some areas related to mechatronic systems were considered. Prof. Karastoyanov presented an overview of the currect developments in this field in the Bulgarian Academy of Sciences.

Assoc. Prof. Jean Michel Sellier visited Rome, Italy, Die Carlo, University of Tor Vergata in the period 13-21 July 2014 for open discussions and one seminar on the 17-th of July. The talk Assoc.

Prof. Sellier presented was entitled “The Multi-Dimensional Transient Challenge: The Wigner Particle Approach” and focused on the recent results we obtained in the field of Wigner Monte Carlo simulations applied to chemical and atomistic systems. The results concerning the simulation of many-body quantum problems by means of the Wigner formalism in the case of distinguishable particles and indistinguishable Fermions and Bosons were presented.

Assoc. Prof. Dimo Dimov visited the Universitat de Barcelona (UB) Barcelona Spain for the period 2-10 September 2014. Prof. Dimov gave a lecture on "Video stabilisation" aimed at establishing of scientific research contacts that are expected to be useful for the IICT developments in the field of "Signal and Image Processing" (a priority of AComIn project).

Prof. Ivan Dimov visited Toulon-Var, France - University of the South for the period 5-31 October 2014. During his visit he has produced a scientific research on the topic of Monte Carlo methods to solve integral equations and on sensitivity analysis research on various air pollutant. The visit included working meetings and seminars. Prof. Dimov gave several talks on Monte Carlo methods for integral equations in application for sensitivity analysis. Discussions on Monte Carlo methods for multidimensional integral equations in environmental research were held. The meetings with prof. Silvain Mer ultimately led to a creation of an article “A Study of Biased and Unbiased Stochastic Algorithms for Solving Integral Equations" submitted to the Journal of Computational and Applied Mathematics.

Assoc. Prof. Stefka Fidanova visited the University of Pavia, Italy – a project partner, in the period 19-28 November 2014. During the short visit, Assoc. Prof. Fidanova gave two seminars with titles as follows: „HPD Model for Protein Structure Simulation“ and „Ant Algorithm for Image Edge Detection“. The lectures were attended by scientists from the laboratory of Prof. Cantoni as well as PhD students from the Computer Science department.

Corresponding Member Svetozar Margenov visited the University of Duisburg Essen, Germany – a project partner in the period 2-5 March 2015. The objective of the visit was to carry out joint work with Prof. Johannes Krauss and his group in the field of advanced scientific computing (numerical methods and algorithms).

Prof. Galia Angelova, Prof. Dimitar Karastoyanov, Prof. Kostadin Kostadinov, Nikolay Stoimenov, and **Stanislav Gyoshev** visited the University of Pavia, Italy, and the Exhibition “The Battle of Pavia” - a co-event of EXPO 2015 in Milan. The short visit was organised in the period 10-14 June 2015 in connection with the Opening of the exhibition "The Battle of Pavia in 1525”. IICT - BAS participates in the exhibition with 3D figures of historical actors from the Battle of Pavia, printed on the SmartLab 3D printer, based on 3D models created by the University of Pavia. The modeling was performed in collaboration with scientists from the University of Pavia under the guidance of Prof. Virginio Cantoni – the Head of the Laboratory of multimedia and computer vision. Tactile 3D matrices for 6 existing historical tapestries dedicated to the Battle of Pavia were also presented at the exhibition. They were printed by the AComIn 3D colored printer. The images are specially created to meet the needs of visually impaired people, including Braille inscriptions. In IICT, the main research and development activities were performed by the PhD students Nikolay Stoimenov and Stanislav Gyoshev under the supervision of Dr. Dimitar Karastoyanov. In Pavia Prof. Galia Angelova gave a presentation entitled "The AComIn project and its focus on automatic image tagging" to scientists from the Laboratory of multimedia and computer vision. At the Exhibition opening Prof. Kostadin Kostadinov spoke about the importance of socially significant science that produces visible results for the people, and congratulated the organisers for the modern approach to the digitisation of cultural heritage and the excellent Exhibition that blends Art and Technology.

4 ATTENDING SCIENTIFIC EVENTS, EXHIBITIONS, AND INFORMATION EVENTS

This section presents the participation of IICT experienced researchers in scientific and information events. Attending prestigious events is one of the major instruments for spreading out information about AComIn results to the academic community. Individual reports about these networking activities are stored in the Team Area of the AComIn site.

4.1 Participation in scientific events

In the year 2015, participation in various scientific events were mainly employed for knowledge/research dissemination and to create new contacts with colleagues for possible collaborations in the same or different fields. Some 33 experiences researchers have participated in 43 international scientific events and gave in total 66 presentations. The result was the publication of 52 peer reviewed papers in the event Proceedings of the respected conference. Please note that WP3 does not cover participation in events, organised by IICT with partial AComIn support (this activity is related to WP5 “Dissemination”). Therefore this section enumerates only participation in events organised by external institutions without any connection to AComIn.

We summarise here the individual participations and list the papers that were published in the respective Proceedings.

Dr. Elena Paunova, 2–6 April 2014: 3th Spring Conference of the Union of the Mathematicians in Bulgaria, Borovets, Bulgaria. Dr. Paunova presented a research on the topic of Comparative Characteristics of Serious Games. While games represent different purposes for different target groups, they can be employed to inform about specific problems (health, psychological), to encourage physical activity, as well as for training in specific skills. Such games are compared in the research. The paper has been published (Paunova E., K. Stoilova. Comparative Characteristics of Serious Games. 43th Spring Conference of the Union of the Mathematicians in Bulgaria, 02-06.04, 2014 Borovets, Bulgaria, ISSN 1313-3330, pp. 186 –191). The presentations at the conference covered different topics of the scientific fields of the information technologies, mathematics science and their applications that created conditions for interesting discussions.

Prof. Ivan Dimov and Dr. Jean Michel Sellier, 6-11 April 2014: MCQMC, Leuven, Belgium. The MCQMC Conference is a biennial meeting devoted to the study of Monte Carlo (MC) and quasi-Monte Carlo (QMC) methods, the relationships between the two classes of methods, and their effective application in different areas. MCQMC attracts more than 300 researchers to provide a forum for exchange of the latest theoretical developments and important applications of these methods. Two joint talks were given by Prof. Dimov and Dr. Sellier.

The first talk was entitled “The Wigner-Boltzmann Monte Carlo method and its applications to quantum computing”. Dr. Sellier presented the Wigner-Boltzmann equation. It is a full quantum, time dependent, model able to include the effects of lattice vibrations (temperature) in a natural fashion. Recently a time dependent Monte Carlo technique has been implemented which allows the resolution of the equation in the full phase-space. This paves the way towards practical applications in many different fields such as mesoscopic physics, chemistry, nanotechnologies, etc. In particular, Dr. Sellier has shown applications of this model to a relatively novel field, i.e. the simulation of nanometer scaled semiconductor devices which are candidates to realistic quantum computing. The working regime of these novel devices is based on very low temperatures and exploits single dopants such as Phosporus atoms embedded in Silicon substrate. Dr. Sellier has shown the model and Monte Carlo techniques to

make such simulations feasible and has, then, proceeded with practical applications to single dopants devices. In particular, he has shown the effects of the temperature on the dynamics of wave packets, a result hardly achievable with other full quantum models. The reaction of the audience was encouraging.

The second talk was entitled “A new walk on equations Monte Carlo method for linear algebraic problems” and was given by Prof. Dimov. A new Walk on Equations (WE) Monte Carlo algorithm for linear Algebra (LA) problem was proposed and studied. This algorithm relies on a non-discounted sum of an absorbed random walk and can be applied for either real or complex matrices. Several techniques like simultaneous scoring or the sequential Monte Carlo method improve the original algorithm. Many persons were present at this talk and the reaction of the audience was very positive. A long discussion after the talk was started due to the impressive results shown by Prof. Dimov, in particular the comparisons between the WE results and the Conjugate Gradient results. Several persons asked more details about the algorithm in order to use it for their particular numerical needs.

Prof. D. Karastoyanov and Dr. T. Penchev: 16-19 April, 2014: The International Conference on Manufacturing Science and Engineering, Lisbon, Portugal**.** The ICMSE 2014 was attended by participants of over 34 Countries (speakers and listeners) of 6 Continents. The objective of the conference is to cover topics in the areas of Energy Efficiency, Robotics, Nano Materials and Manufacturing.

Prof. Karastoyanov presented a talk on ”Mobile Wireless Investigation Platform” in which results were included from the introduction of a kind of autonomous mobile robots, intended for work and adaptive perception in unknown and unstructured environment. Modular system for the mechanical construction of the mobile robots is proposed. Special PLC on the base of AtMega128 processor for robot control is developed. Electronic modules for the wireless communication on the base of Jennic processor as well as the specific software are developed. The methods, means and algorithms for adaptive environment behavior and tasks realisation are examined. A more concise introduction of the work can be found in Karastoyanov, D., and T. Penchev. "Mobile Wireless Investigation Platform.".

Dr. Penchev introduced “Experimental Study of Upsetting and Die Forging with Controlled Impact” where results were included of research of deformation by upsetting and die forging of lead specimens with controlled impact. Laboratory setup for conducting the investigations, which uses cold rocket engine operated with compressed air, is described. The results show that when using controlled impact is achieving greater plastic deformation and consumes less impact energy than at ordinary impact deformation process. A paper was published (Penchev, Todor, and Dimitar Karastoyanov. "Experimental Study of Upsetting and Die Forging with Controlled Impact." *International Conference on Manufacturing Science and Engineering (ICMSE 2014)*. 2014.) Further contact with well-known foreign scientists were established.

Assoc. Prof. Kiril Simov, 8-10 May 2014: Workshop on Linked Data, Language Technologies and Multilingual Content Analytics, Madrid, Spain. The workshop has been organized from the EU Project LIDER and was a meeting venue for experts working on LOD and Natural Language Processing. We further develop language technologies for linked data and big data warehousing. On the workshop various topics were discussed: relationship between social media and Wikipedia, language technologies and content management technologies used to increase the quality in machine reading/learning for translations on different languages.

Assoc. Prof. Stoyan Mihov, 19-20 May 2014: Conference DATeCH 2014, Madrid, Spain. The conference was attended by 196 people, interested in the digitisation of cultural heritage. Dr. Mihov was part of the program committee and has reviewed six articles; in Madrid he chaired a Session on Enrichment. Dr. Mihov presented a talk entitled “An approach to unsupervised historical text normalisation”, where a novel approach to unsupervised noisy text correction was introduced. The

approach is based on automatic extraction of historical variation patterns by analysing the structure of the words from a historical corpus and comparing it with the structure of the contemporary dictionary. The quality of the presented unsupervised approach is empirically compared against a supervised system competitive with the state-of-the-art supervised text normalisation systems. The paper is published in the DATeCH 2014 Proceedings: Mitankin, Petar, Stefan Gerdjikov, and Stoyan Mihov. "An approach to unsupervised historical text normalisation." *Proceedings of the First International Conference on Digital Access to Textual Cultural Heritage*. ACM, 2014.

Dr. Ivan Georgiev and **Dr. Tasho Tashev**, 19-22 May 2014: International Conference on Numerical Methods for Scientific Computations and Advanced Applications, Bansko, Bulgaria. The NMSCAA was attended by over 70 participants including 11 invited plenary speakers from leading European and North American universities. The main objective of the NMSCAA was to bring together academic scientists and researchers in the areas of numerical methods and scientific computations to exchange and share their experiences and research results. Dr. Tashev presented ”A Numerical Procedure for Computation of the Upper Bound of the Throughput of a Crossbar Switch Node” where he showed results on the algorithm for maximising the speed of data traffic through a switch (communication device). Constantly increasing volumes of the communication traffic requires new more effective algorithms, which have to be checked for efficiency. The efficiency of the switch performance is firstly evaluated by the throughput (THR) provided by the node. The next important characteristic is the average time for waiting (average cell delay), before the packet is send for commutation. A numerical procedure for computation of the upper bound of the THR is described, which allows for a calculation of the first limit.

Dr. Ivan Georgiev was involved with the organisation of the conference with cooperation with SIAM. He also presented a talk on “A computational approach for the seismic damage response of adjacent RC structures strengthened by cables”.

Prof. D. Karastoyanov, 26-29 May 2014: 2nd Austrian Indian Symposium on Materials Science and Tribology MATri14, Viena, Austria. Prof. Karastoyanov participated in the conference with a paper and presentation on “Static and Dynamic Friction of Sphero-graphite Cast Iron with Sn Microalloy’’. The presentation focused on the influence of Sn quantity in sphero-graphite cast iron specimens during two contact interaction states: preliminary displacement (static friction) and motion (dynamic friction). Two important tasks were considered and solved respectively: development of procedures and devices for static and dynamic dry friction study at various normal loads and sliding velocity; Study of friction force and coefficient at static friction and dynamic friction. The published paper is: Kandeva, Mara, et al. "Static and Dynamic Friction of Sphero-graphite Cast Iron with Sn Microalloy." *2nd International Conference MaTri14, Vienna*. 2014.

Dr. M. Lymbery, 2-6 June 2014: International conference "Modelling" 2014, Roznov, Czech Republic. Dr. Lymbery presented research results on the Incomplete Factorization by Local Exact Factorization. The international conference ”Modelling” 2014 was devoted to the 80-th birthday of professor Owe Axelsson, a pioneer in multilevel methods. Many distinguished scientists were present. This prestigious conference was of great importance for providing the chance to meet new people and new ideas, to establish future collaborations based on strong scientific research.

Assoc. Prof. Jean Michel Sellier, 2-7 June 2014: IWCE Conference, Paris, France. Dr. Sellier was invited speaker in the IWCE Conference, which is one of the most influential conferences in the field of semiconductor devices simulation. Dr. Sellier presented “The Multi-Dimensional Transient Challenge: The Wigner Particle Approach” focusing on recent results obtained in the field of Wigner Monte Carlo simulations applied to semiconductor devices. In particular, those results included simulations of wave packets in proximity of phosphorus dopants embedded in silicon substrate at finite temperature and

results concerning the simulation of many-body quantum problems by means of the Wigner formalism. The IWCE community has reacted incredibly well to the results presented and many of them have expressed their will to collaborate with the group on several levels.

Assoc. Prof. V. Guliashki, 3-6 June 2014: International Conference on Nonlinear Dynamics of Electronic Systems, NDES'2014, Albena, Bulgaria. Dr. Guliashki presented a talk entitled „A PROMETHEE – Based Approach for Multiple Objective Voltage Regulator Optimization". An approach to solve the multiple objectives problem for optimal choice of circuit elements parameters among a set of possible alternatives was introduced. The considered combinatorial problem is decomposed in sub-problems to reduce considerably the number of investigated alternatives. The approach is illustrated on two voltage regulator circuits. The results obtained are encouraging and the efficiency of the approach increases when the number of circuit elements and the alternatives set cardinality is larger. More than 120 researchers with 62 reports were present in 13 sections. Important contacts for future collaborations were established with other scientists.

Assoc. Prof. Petia Koprinkova-Hristova and **Dr. Y. Todorov,** 22-26 June 2014: INISTA 2014 International Symposium on INnovations in Intelligent SysTems and Applications, Alberobello, Italy. Dr. Petia Koprinkova-Hristova presented a paper entitled "Sound Fields Clusterisation via Neural Networks" as a coauthor together with Assoc. Prof. Kiril Alexiev. The research results concern the development of intelligent approach for multidimensional data clusterisation that was applied to processing of the signals obtained from the microphone antenna - part of the AComIn equipment. Dr. Todorov presented two collaborative research papers entitled: "State-Space Fuzzy-Neural Network for Modeling of Nonlinear Dynamics" and „An Intelligent Approach to Formulate the Contents of Novel Functional Food". The former presentation included a novel idea for designing a fuzzy-neural network for modeling of nonlinear system dynamics. The presented approach assumes a state-space representation in order to obtain a more compact form of the model, without statement of a great number of parameters needed to represent a nonlinear behavior. The latter paper introduced an applied approach using an Adaptive Neuro-Fuzzy Inference System to formulate the contents of novel diary functional food. He has also chaired a session on Human Interfaces. The published papers are:
Todorov, Yancho, et al. "An intelligent approach to formulate the contents of novel functional food." *Innovations in Intelligent Systems and Applications (INISTA) Proceedings, 2014 IEEE International Symposium on*. IEEE, 2014. and Todorov, Yancho, and Margarita Terziyska. "State-space fuzzy-neural network for modeling of nonlinear dynamics." *Innovations in Intelligent Systems and Applications (INISTA) Proceedings, 2014 IEEE International Symposium on*. IEEE, 2014.

Prof. D. Karastoyanov, Assoc. Prof. L. Doukovska, Assoc. Prof. Vladimir Monov, and **Dr. V. Atanassova**, 23-28 June 2014: International Symposium on Business Modeling and Software Design – BMSD'14, and International Conference on Telecommunications and Remote Sensing – ICTRS'14, Grand Duchy, Luxembourg. . Assoc. Prof. Doukovska presented research results related with the Neural Networks Applications in Forecasting Financial Markets and Stock Prices during the Fourth International Symposium on Business Modeling and Software Design, BMSD'14.

Assoc. Prof. V. Monov participated with a full paper and gave a presentation entitled "Significance of the Predictive Maintenance Strategies for SMEs" dealing with the development of advanced diagnostic technologies in the maintenance practice of small and medium enterprises (SMEs). During the ICTRS'14 a presentation on the "Implementation of a service oriented architecture in smart sensor systems integration platform" was given where a new developed platform for smart sensor network data integration based on a service oriented architecture is presented.

Dr. Vassia Atanassova presented the papers:
(i) Shahpazov G., L. Doukovska, V. Atanassova - Uncertainty Modeling in the Process of SMEs Financial Mechanism Using Intuitionistic Fuzzy Estimations, Proc. of the International Symposium on Business Modeling and Software Design – BMSD'14, 24-26 June 2014, Luxembourg, Grand Duchy of

Luxembourg, ISBN 978-989-758- 032-1, pp. 271-275, 2014.
(ii) Atanassova V., L. Doukovska, K. Atanassov, D. Mavrov - InterCriteria Decision Making Approach to EU Member States Competitiveness Analysis, Proc. of the International Symposium on Business Modeling and Software Design – BMSD'14, 24-26 June 2014, Luxembourg, Grand Duchy of Luxembourg, ISBN 978-989-758- 032-1, pp. 289-294, 2014.

The group of IICT researchers presented interesting results derived from the application of IICT's recently developed decision making approach to data from the World Economic Forum's Global Competitiveness Reports for the years 2008–2009 to 2013–2014. The discussed approach, called 'Intercriteria Decision Making', employs the apparatus of index matrices and intuitionistic fuzzy sets to produce from an existing multiobject multicriteria evaluation table a new table that contains estimations of the pairwise correlations among the set of evaluating criteria, called 'pillars of competitiveness'.

Prof. Karastoyanov presented also the paper:
Karastoyanov D., L. Doukovska, V. Atanassova. Electromagnetic Linear Micro Drives for Braille Screen: Characteristics, Control and Optimization, Proc. of the Third International Conference on Telecommunications and Remote Sensing – ICTRS'14, 26-27 June 2014, Luxembourg, Grand Duchy of Luxembourg, ISBN 978- 989-758-033-8, pp. 88-93, 2014. This paper included the presentation of the newly developed type of graphical Braille screen; permanent magnet linear actuator intended for driving a needle in Braille screen has been optimized. Finite element analysis, response surface methodology and design of experiments have been employed for the optimization. The influence of different parameters of the construction of a recently developed permanent magnet linear electromagnetic actuator for driving a needle in a Braille screen is discussed.

Assoc. Prof. V. Guliashki, 25-27 June 2014: International scientific conference ICEST'2014, Niš, Republic of Serbia. Dr. Guliashki presented two reports as follows: the first one is „An exact interactive method for solving multiple objective integer problems" with authors Vassil Guliashki and Leoneed Kirilov. The research introduced an interactive population-based method to solve multiple objective convex integer optimization problems. A heuristic procedure is used to speed up the search process. The method finds exact nondominated solutions. The second one is "Image deblurring methods and image quality evaluation" with authors Vassil Guliashki and Dimo Dimov. The presentation and paper survey the methods and approaches for digital software image stabilization by algorithmic image deblurring, so that the original form of the image is restored in the best possible way and the image is altered in a sharper, clearer state.

Dr. Tasho Tashev, 27 June 2014: Conference on Computer Systems and Technologies (CompSysTech'14), Ruse, Bulgaria. Dr. Tashev gave a presentation entitled "Computer Simulations of a Modified MiMa-algorithm for a Crossbar Packet Switch", which introduces computer simulations of an algorithm for non-conflict packet commutation in a crossbar switch node. The conference was attended by over 60 participants (speakers and listeners) from 6 countries. The main objective of the CompSysTech'14 was to bring together academic scientists and researchers to exchange and share their experiences and research results.

Dr. Stanislav Stoykov, 6-11 July 2014: 8th European Nonlinear Dynamics Conference (ENOC 2014), Vienna, Austria. Dr. Stoykov participated in the International Conference where he presented his work. The conference is one of the strongest in the field of nonlinear dynamics, this is confirmed also from the fact that most of the famous scientist in nonlinear dynamics attended it. The presentation was on the topic of "Frequency response of cylindrical variable stiffness composite laminated shells". The work was a collaboration with Prof. Pedro Ribeiro from University of Porto, Portugal. Variable stiffness materials are advanced materials which give new opportunities to industry, so one can change the dynamical properties of the structure without changing its geometry, neither the material, just by changing the curvature of the fibres.

Dr. E. Paunova, 7-9 July 2014: 6th International Conference on Education and New Learning Technologies (EDULEARN'14), Barcelona, Spain. Dr. Paunova presented results with two talks:

Paunova, E., V. Terzieva, Y. Stoimenova, P. Kademova-Katzarova. Teachers' Attitude to Educational Games in Bulgarian Schools, Proceedings of EDULEARN, 07-09 July 2014, Barcelona, Spain, ISBN: 978-84-617-0557-3, pp. 6471-6481. The topic examines the attitude of teachers in Bulgaria to the educational games. The teachers' opinions are collected through a survey conducted in several schools from different towns. The obstacles for serious games' wide usage in Bulgarian schools are discussed. In addition, some considerations, about which types of learning games seem to suit implementing different pedagogical methods in particular subjects, are given. A combination of several conditions is necessary to change the style and techniques of teaching: technical equipment in classrooms, creating learning games that correspond to subject curriculum, a positive attitude of teachers.

Terzieva, V., E. Paunova, P. Kademova-Katzarova, Y. Stoimenova. Implementation of ICT-Based Teaching in Bulgarian Schools, Proceedings of EDULEARN, 07-09 July 2014, Barcelona, Spain, ISBN: 978-84-617-0557-3, pp. 6497- 6506. The second paper investigates the Bulgarian teachers' attitude to the ICT-based teaching. The purpose is to define the place of ICT in the context of traditional education. It analyses also diverse pedagogical methods that take advantage of new learning technologies and their application in different teaching-learning situations. The paper also examines the institutional support, which the teachers in Bulgaria receive with applying the new technologies in the school education. Some examples of effective teaching strategies exploiting ICT tools in different subjects across the curriculum are discussed. An overview of benefits and drawbacks of the technology enhanced education is presented.

Assoc. Prof. A. Tchamova, 7-10 July 2014: 17th International Conference on Information Fusion (Fusion 2014), Salamanca, Spain. During the conference Assoc. Prof. Tchamova gave a talk on the topic of "Can we trust subjective logic for information fusion?" The conference is the most significant and recognisable annual event in the field of Information Fusion and its impact for industry and institutions. The presentation of Assoc. Prof. Tchamova introduced an examination of the main bases of Subjective Logic (SL) and reveal serious problems with them. The proposal of a new interesting alternative way for building a normal coarsened basic belief assignment from a refined one is introduced. An analysis of the defects in the SL fusion rule and the problems in the link between opinion and Beta probability density functions is established.

Prof. D. Karastoyanov and **Dr. Vl. Kotev**, 15-22 July 2014: 18th International Conference on Circuits, Systems, Communications and Computers (CSCC 2014), Santorini Island, Greece.

Dr. Kotev presented the talk "Force Sensing of Teleoperated Robotized Cell Injection" where a description of cell injection process and mechanical deformation over the cell contour is given. The main purpose is to be developed an algorithm that determines the value and direction of operator force interaction on the cell. This force information is calculated using the visual deformation of the cell contour. After evaluation of the force vector it is feed back to the operator through human-machine interface tool with force feedback unit. Several subtasks for this process are described and short presentations of the used environments are given

Prof. Karastoyanov presented the paper "Forging by Rocket Driven Hammer: Dynamics and Experiments". The talk introduced the influence of impact parameters such as forces, accelerations, velocities, time and energy on shape forming of parts achieved by rocked driven hummer. A laboratory set up for control of impact utilizing a cold rocket engine working with compressed air was created. This experimental set up allows for the generation of an additional force on a body during the impact period. In order to control the working conditions in forging the dynamics of the impact process is analyzed. Also, experiments on plastic deformation of specimens were conducted on this set up using controlled impact. The papers presented at the conference are published in the following magazines:
(i) Kostadinov K., Kotev V., Penchev D.: Force Sensing of Teleoperated Robotized Cell Injection, Advances in Robotics, Mechatronics and Circuits, pp: 160-163, 2014, ISBN: 978-1- 61804-242-2.

(ii) Karastoyanov D., Kotev V. and Penchev T.: Forging by Rocket Driven Hammer: Dynamics and Experiments, Advanced in Engineering Mechanics and Materials, pp: 174-177, 2014, ISBN 978-1-61804-241-5.

Prof. I. Mustakerov and **Assoc. Prof. D. Borissova**, 16-22 July 2014: 18th International Conference on Circuits, Systems, Communications and Computers (CSCC 2014), Santorini Island, Greece. They presented two talks: “One-dimensional cutting stock model for joinery manufacturing” and “A parallel algorithm for optimal job shop scheduling of semi-constrained details processing on multiple machines”. The first talk describes manufacturing problem of joinery work investigated as one-dimensional cutting stock problem by means of combinatorial optimisation. The advantage of the proposed approach is the possibility to determine simultaneously the optimal length of the blanks and optimal cutting patterns for each blank. In contrast to heuristic approaches to this type of problems the described approach defines solution as a global optimum. The reduction of cutting trim loss is one of the main problems in joinery manufacturing. This problem turns to be important especially for large scale projects where the joinery work for a whole building or for several buildings has to be done. The described approach can contribute not only to reduce the trim loss via optimization of length of the blanks and cutting patterns, but also could decrease the overall production time and costs.

The second presentation focuses on a deterministic job shop scheduling approach for details processing on multiple machines based on integer linear programming model is described. The goal of described job shop scheduling is to determine the minimum makespan for a number of semi-dependant details (some with independent processing and other with dependant of each other processing) with different operations on different machines. To find the minimum of total makespan, a number of identical optimization tasks corresponding to all permutations of independent details processing sequences are formulated. The main contribution of the paper is using of the developed model in an algorithm based on solving of all formulated tasks in parallel. The execution of the algorithm provides a set of job shop optimal schedules for all possible details processing sequences. Then the best schedule and corresponding processing sequence in sense of minimal makespan are determined. Prof. I. Mustakerov also chaired a session on "Data Mining and Query Processing".

Dr. T. Penchev, 11-12 August 2014: International Conference on Mining, Material and Metallurgical Engineering (MMME 2014), Prague, Czech Republic. The main objective of the MMME 2014 is to cover broad fields of fundamental or applied research in the areas of Energy Efficiency, Material processing modelling, and Materials Manufacturing. MMME 2014 highlight is how Manufacturing Science fundamentals can be applied to optimise the complex process starting with the extraction of ore, smelting and processing of metallic, ceramic, plastic and composite materials. Dr. Penchev introduced a talk entitled “Comparative Analysis of the parameters of spherical and Relo body balls for drum mills”. There a new type of grinding media – a Relo body is presented. The geometrical and metallurgical parameters of the Relo body and spherical balls are analysed and compared with respect to comminution productivity.

Assoc. Prof. Jean Michel Sellier and **Dr. T. Tashev,** 19-24 August 2014: Conference NMA 2014 (Numerical Methods and Applications), Borovets, Bulgaria.

Dr. Jean Michel Sellier participated with a talk entitled "Sensitivity Analysis of Design Parameters for Silicon Diodes". The talk was focused on the engineering related problem of determining what parameters are important for the design of semiconductor devices, with a special attention to silicon diodes. In particular, Dr. Sellier showed how the tenets of sensitivity analysis can be applied for this technology relevant problems in a practical way. Dr. Sellier also participated in an open discussion session with a talk on “The Multi-Dimensional Transient Challenge: The Wigner Particle Approach”, focusing on the recent results obtained in the field of many-body Wigner Monte Carlo simulations.

Assistant Prof. Tashev presented a talk entitled ”A Numerical Study of the Upper Bound of the Throughput of a Crossbar Switch Utilizing MiMa-algorithm”, where results were shown on a family of patterns for hotspot load traffic simulating. Results from computer simulations of the throughput of a

crossbar packet switch with these patterns were also presented.

Prof. D. Karastoyanov, 6-11 September 2014: ICEET 2014 - International Conference on Electrical Engineering and Technology, Geneva, Switzerland. Prof. Karastoyanov presented a talk on "Coupled Electromagnetic and Thermal Field Modeling of a Laboratory Busbar System". The talk presents coupled electromagnetic and thermal field analysis of busbar system (of rectangular cross-section geometry) submitted to short circuit conditions. The laboratory model was validated against both analytical solution and experimental observations. The considered problem required the computation of the detailed distribution of the power losses and the heat transfer modes. In this electromagnetic and thermal analysis, different definitions of electric busbar heating were considered and compared.

Prof. Galia Angelova and **Assoc. Prof. Petia Koprinkova-Hristova,** 9-14 September 2014, Varna, Bulgaria: Conference AIMSA 2014 (Artificial Intelligence: Methodologies, Systems and Applications. AIMSA belongs to an established series of well-recognised international conferences in Artificial Intelligence that are held biennially in Bulgaria since 1984. More than 60 participants from 23 countries attended the AIMSA 2014 conference. Two talks were given by the AComIn representatives, to resent the papers (i) Nikolova, I., D. Tcharaktchiev, S. Boytcheva, Z. Angelov and G. Angelova. Applying Language Technologies on Healthcare Patient Records for Better Treatment of Bulgarian Diabetic Patients and (ii) Koprinkova-Hristova, P., Alexiev, K., Dynamic sound fields clusterization using neuro-fuzzy approach. Both papers present AComIn results, the first one in the area "Language and Semantic Technologies" and the second one in "Signal and Image Processing". The AIMSA proceedings is published by Springer in the series Lecture Notes in Artificial Intelligence.

P. Koprinkova-Hristova and **Dr. Y. Todorov,** 14-20 September 2014: 24th International Conference on Artificial Neural Networks 2014 (ICANN`2014), Hamburg, Germany. Dr. Koprinkova-Hristova was a ICANN'2014 International Programme Committee member, and a chair of the session on Reinforcement learning. She introduced her investigations on the observed effects of Ip tuning of Echo State Networks in the part of the development of an algorithm for multidimensional data clustering that was recently applied to processing of the signals obtained from the microphone antenna.

Dr. Yancho Todorov presented a collaborative research paper entitled: "Modeling of Chaotic Time Series by NEO-fuzzy Neural Network". The research describes the development of Interval Type-2 NEO-Fuzzy Neural Network for modeling of complex dynamics. The proposed network represents a parallel set of multiple zero order Sugeno type approximations, related only to their own input argument. The induced gradient based learning procedure, adjusts solely the consequent network parameters. To improve the robustness of the network and the possibilities for handling uncertainties, Type-2 Gaussian fuzzy sets are introduced into the network topology.

Galia Angelova, 17-20 September 2014: The 10th International Conference on Linguistic Resources and Tools for Processing the Romanian Language, Craiova, Romania. Prof. Angelova was a keynote speaker with a talk on "Language Technologies in Healthcare". She presented the work done in IICT-BAS in previous research projects, dedicated to automatic analysis of clinical narratives, and also discussed the elaborations within AComIn that enable large-scale analysis of outpatient records. Especially she considered the extraction of numeric values and drug treatments which turn to be very useful in the automatic generation of a Diabetic register in Republic of Bulgaria.

Assoc. Prof. Gennady Agre, 3-8 November 2014: 5-th International Conference EUROMED 2014 Digital Heritage: Progress in Cultural Heritage Documentation, Preservation and Protection, Limassol, Cyprus. Dr. Agre took part of the 5-th International Conference EUROMED 2014 Digital Heritage: Progress in Cultural Heritage Documentation, Preservation and Protection which gathered 351 participants – ICT specialists, archaeologists, restorers, museum workers etc. from 43 countries. The main aim of the participation was establishing contacts to the Society for Cultural Heritage Digitisation, which is a topic of interest for AComIn.

Assoc. Prof. Dimitar Tcharaktchiev, 22-27 February 2015: 7th International Conference on eHealth, Telemedicine, and Social Medicine eTELEMED 2015, Lisbon, Portugal. Dr. Tcharaktchiev attended the event and gave a talk entitled "Towards Integrated Analysis of Risk Factors and Diabetes Prevention using Big Data and Natural Language Processing". The paper presents recent results in integration of an anonymous register for the diabetic patients in Bulgaria. The integrated archive allows tracking numerous visit of the same patient to general practitioners and the changes of values of lab tests related to diabetes compensation. The paper shows how timelines of events related to de-compensations can be computed and used for improving the health management. Another useful result is discovery of potential diabetic patients (who have not been diagnosed formally yet). In this way the register can serve as a repository supporting early alerts in various cases.

Dr. Kristina Jakimovska, 13-16 April 2015: "Science and Motor Vehicles 2015 – International Automotive Conference", Belgrade, Serbia. Dr. Jakimovska was part of the conference on Science and Motor Vehicles 2015 – International Automotive. The main topics of the conference were: Simulations in Automotive Engineering, Automotive Safety, 5E (Engines, Emissions, Ecology, Environment & Energy), Advanced Engineering Techniques & Tools, Automotive Logistics. During the conference she presented a publication „Application of fuzzy AHP method for vehicle roadworthiness evaluation" which was held in the technical session „Automotive Safety". The study proposes fuzzy AHP method to evaluate the vehicle roadworthiness. The AHP established by Saaty is a method to solve multiple criteria decision problems by setting their priorities. Within the proposed methodology, a decision group and vehicle roadworthiness framework containing 14 indicators are firstly established. The fuzzy weights of the vehicle roadworthiness indicators are calculated based on the pair-wise comparisons. The results demonstrate the engineering practicability and effectiveness of this method in vehicle roadworthiness evaluation also importance of the weights on the various indicators are being illustrated.

Prof. Svetozar Margenov, 11-20 May 2015: 7th International Conference on Porous Media & Annual Meeting INTERPORE'15, Padova, Italy. Prof. Margenov visited the University of Padova for the annual meeting INTERPORE'15. He presented a talk entitled "Robust Multilevel Solution Methods for Heterogeneous Problems of High-Frequency and HighContrast". He further chaired a session.

Dr. Ivan Georgiev and **Prof. Krasimir Georgiev**, 24-30 May 2015: High Performance Computing in Science and Engineering, Ostrava, Czech Republic. Dr. Ivan Georgiev and Dr. Krasimir Georgiev presented two posters during the conference: "On some recent results in AComIn (Advanced Computing for Innovation) Project using SmartLab equipment" and "Advance methods for structure and properties characterisation of fiber-reinforced silicate composites".

Dr. Todor Penchev, 4-6 June 2015:3rd International Conference on Sustainable Development, Pontifical Gregorian University of Rome, Rome, Italy. Dr. Penchev presented a report on „Briquetting of aluminum alloy chips with controlled impact" which sets results of experimental investigation of the possibility to obtain briquettes from aluminum alloys chips, with a greater density than the density of the briquettes obtained by the existing technology. It also investigated the possibility of obtaining various machine parts through subsequent plastic deformation of the briquettes (instead of melting them). The process used for preparation of briquettes with high density, is an original technology, which achieves a large increase in efficiency of metal waste utilization and in energy saving. This technology can also be used for the preparation of parts by powder metals and alloys. The report was part of a wider presentation of the reports of this section on methods to protect the environment by recycling wastewater, optimal use of natural resources and the introduction of ethical standards in the industry.

Assist. Prof. Yancho Todorov, 9-12 June 2015: International IEEE conference on „Process Control'15", Slovak University of Technology in Bratislava, Stribske Pleso, Slovakia. Dr. Todorov has

presented a collaborative research paper entitled: “Simple Heuristic Approach for Training of Neo-Fuzzy Neural Networks”. The presentation describes the development of Interval Type-2 NEO-Fuzzy Neural Network for modeling of complex dynamics. The proposed network represents a parallel set of multiple zero order Sugeno type approximations, related only to their own input argument. He has also chaired the scientific session on “Modeling and Identification of Industrial Process”.

Assoc. Prof. Lyubka Doukovska, 23-27 June 2015: Radar Symposium, IRS-2015, Dresden, Germany. Dr. Doukovska presented “Conventional Hough Detector in Presence of Randomly Arriving Impulse Interference" proposing an alternative solution allowing for better targets detection in conditions of randomly arriving impulse interference with Poisson distributed flow and Raleigh amplitude distribution.

Assoc. Prof. Lyubka Doukovska, Dr. Irina Radeva, and **Assoc. Prof. Vladimir Monov,** 5 - 9 July 2015: Fifth International Symposium on Business Modeling and Software Design, BMSD'15, Milan, Italy. Dr. I. Radeva participated with a scientific paper and presentation entitled “InterCriteria Software Design: Graphic Interpretation within the Intuitionistic Fuzzy Triangle” with authors Deyan Mavrov, Irina Radeva, Krassimir Atanassov, Lyubka Doukovska, and Ivan Kalaykov. This work presents the results obtained in implementation of the basic ICA algorithm, a recently developed additional feature for graphical interpretation of the results of ICA, plotted as points in the Intuitionistic Fuzzy Interpretational Triangle, which reflects in the software application the new theoretical developments of the ICA approach.

Assoc. Prof. Doukovska presented four papers at the event:

(i) Mavrov D., I. Radeva, K. Atanassov, L. Doukovska, I. Kalaykov - InterCriteria Software Design: Graphic Interpretation within the Intuitionistic Fuzzy Triangle, Proc. of the International Symposium on Business Modeling and Software Design — BMSD'15, Milan, Italy, ISBN 979-989-758-111-3, pp. 279-283, 2015.

(ii) Doukovska L., V. Atanassova, G. Shahpazov, F. Capkovic - InterCriteria Analysis Applied to Various EU Enterprises, Proc. of the International Symposium on Business Modeling and Software Design — BMSD'15, Milan, Italy, ISBN 979-989-758-111-3, pp. 284-291, 2015.

(iii) Doukovska L., D. Karastoyanov, N. Stoymenov, I. Kalaykov - InterCriteria Decision Making Approach for Iron Powder Briquetting, Proc. of the International Symposium on Business Modeling and Software Design — BMSD'15, Milan, Italy, ISBN 979-989-758-111-3, pp. 292-296, 2015.

(iv) Karastoyanov D., L. Doukovska, S. Gyoshev, I. Kalaykov - InterCriteria Decision Making Approach for Metal Chips Briquetting, Proc. of the International Symposium on Business Modeling and Software Design — BMSD'15, Milan, Italy, ISBN 979-989-758-111-3, pp. 297-301, 2015.

Assoc. Prof. Monov participated with a scientific paper and presentation entitled “Software implementation of several production scheduling algorithms” authored by V. Monov, T. Tashev and A. Alexandrov. This work presents the results obtained in the development of an experimental program system implementing algorithms for inventory control and production scheduling in small and medium enterprises.

Dr. Emilia Abadjieva, 12-15 July 2015: Euro 2015 conference, Glagow, UK. The conference EURO 2015 (27th Europen Conference on Operational Research) is organised in conjunction with the UK Operational Research Society, the oldest O.R. Society in the world with about 2,700 members in 66 countries. The OR Society is both a learned society and a professional body, and this link between academia and practice is reflected in the strong “Making an Impact” theme within the conference. A presentation entitled “3D Software Technology for Practical Realization of Special Hyperboloid Gear Mechanisms” was given by Emilia Abadjieva.

Assoc. Prof. Petia Koprinkova-Hristova, 12-17 July 2015: International Joint Conference on Neural Networks 2015, IJCNN'2015, Killarney, Ireland. Dr. Koprinkova-Hristova presented a paper entitled "On effects of IP improvement of ESN reservoirs for reflecting of data structure" continuing the work on the effects of Intrinsic Plasticity (IP) tuning of Echo state networks (ESN) on the memory capacity of the equilibrium states of neurons. The obtained results are related to investigation of the developed algorithm for multi-dimensional data clustering that was successfully applied to numerous real big data sets, including for creation of "sound pictures" from the microphone antenna. IJCNN is the annual conference of the International Neural Networks Society (INNS) that is organised in cooperation with the IEEE Computational Intelligence Society (IEEE-CIS). It traditionally attracts participants from all over the world and the plenary talks were given by famous scientists from the areas of neural networks, neuroscience, machine learning algorithms and their applications. Dr. Koprinkova-Hristova chaired the session on "Structures and hierarchies".

Dr. Emilia Abadjieva, 26-30 July 2015: International Conference in Mechanics and Materials in Design (M2D2015), Ponta Delgada. The conference themes address novel and advanced topics in mechanics and materials and design focused on analytical and numerical tools at all scales, testing and diagnostics, surface and interface engineering, tribology, mechanical design and prototyping, models of failure, composite and engineered materials, biomechanics, energy and thermos-fluid systems, impact and crashworthiness and case studies. Dr. Abadjieva presented two papers „One Application of the International Terminological Standard BDS ISO 10825 for the Damage Identification of the Teeth of Gear Transmissions“ with authors V. Abadjiev, G. Dimchev, E. Abadjieva and D. Karastoyanov as well as the paper „Spatial Face Rack Drives: Mathematical Models for Synthesis and Software Illustrations” with author Emilia Abadjieva.

Prof. D. Karastoyanov and **Dr. T. Penchev,** 5-8 August 2015: 17th International Conference on Industrial Design Engineering, ICIDE'2015, Amsterdam, Holland. They participated with 2 paper presentations entitled: *(i)* “Study the Influence of the Type of Cast Iron Chips on the Quality of Briquettes Obtained with Controlled Impact” with autors D. Karastoyanov, S. Gyoshev and T. Penchev. The talk introduced results related with the influence of the size, form and orientation of metal chips when they are briquetted using industrial rocket engine; *(ii)* “Experimental Study of Iron Metal Powder Compacting by Controlled Impact” that describes methods for high speed briquetting of metal powder using industrial rocket engine.

Assoc. Prof. Petia Koprinkova, 1-5 September 2015: IEEE INISTA'2015, 2015 International Symposium on Innovations in Intelligent SysTems and Applications, Madrid, Spain. Dr. Koprinkova presented a paper entitled "Investigation of some parameters of a neuro-fuzzy approach for dynamic sound fields visualization". The presented work continues investigations on tuning of sonic parameters of the developed previously algorithm for multi-dimensional data clustering using "echo state" networks (ESN) that was applied currently for creation of 3-dimensional a “sound picture” of the signals obtained by the acoustic camera. She was chairing two sessions.

Dr. Iurii Chyrka, Dr. Aleksey Balabanov, Dr. Stanislav Stoykov, Dr. Olga Kanishcheva, and **Dr. Volodymyr Kudriashov,** 1-5 September 2015: 7th Balkan Conference in Informatics (BCI 2015), Craiova, Romania

Dr. Chyrka presented a paper entitled “A Narrowband Sound Signal Frequency Estimation with Impulsive Noise Filtering”. This work consider a problem of an impulsive noise filtering in the task of instantaneous frequency estimation. The proposed approach can be used for computer processing of the sound records and the signals obtained from the microphone array.

Dr. Balabanov presented a paper “Fast decentralized optimal control algorithm on the basis of Bass’ relation for vehicles in a platoon”. The work considered a problem of reinforcement of decentralized linear quadratic optimal control synthesis in on-board computers of vehicles moving in a platoon. The proposed approach was based in applying Bass’ relation for not completely controllable

dynamic system. The practical result is that the proposed approach showed its numerical performance of solving large scale linear quadratic optimization problem. In particular the vehicles control problem in a platoon was solved analytically and was reduced to two linear matrix equations of half sizes instead of solving matrix quadratic equation.

Dr. Stoykov presented his work on “Space Discretization by B-Splines on Discontinuous Problems in Structural Mechanics”. This is mathematical model of beams with reduced smoothness on the solution. Such problems arise in composite materials, interaction with other elastic bodies, models of structures with damage, etc.

Dr. Kanishcheva gave a talk entitled “A Pipeline Approach to Image Auto-Tagging Refinement”. She introduced an approach for post-editing of keywords which are assigned to images by a realistic auto-tagging platform. The proposed approach can be used for post-editing tags in different social networks; it is also suggested employing linguistic resources that define English lexical semantics (WordNet) for consolidation of tags. This paper received the "Best Paper Award" at BCI-2015.

Dr. Kudriashov presented a paper entitled “Non-stationary Random Wiener Signal Detection Criterion Variants for Case of Monostatic Reception”. The presentation described the developed detection rules and information about the Acoustic Camera in AComIn Smart Lab. Spectra of acoustic emission of ball bearings estimated by focalization of microphone array on emission sources were presented too.

Dr. Iurii Chyrka and **Dr. Volodymyr Kudriashov**, 17-18 September, 2015: “International Conference on Telecommunications and Remote Sensing (ICTRS 2015)”, Rhodes, Greece.

Dr. Chyrka presented a paper entitled “Fast Direction-of-Arrival Estimation for Single Source” focusing on a solution for a single source localization via fast spatial frequency estimation. There are two cases near- and far-filed localisation considered in the work. This approach can be used for linear arrays with sensors of different types: radio receivers, microphones, accelerometers, etc.

Dr. Kudriashov presented his work entitled: “Non-stationary Random Wiener Signal Detection with Multistatic Acoustic System”. The presentation included the developed detection rule, experimental results and information about the AComIn Smart Lab equipment. Acoustic images in 3D spatial coordinates were presented. The images were generated for bandwidth that is twice more than center frequency. The images were generated using the AComIn Acoustic Camera modified to bistatic and multistatic modes.

Assoc. Prof. Kristina Jakimovska, 22–26 September 2015: XXI Triennial International Conference on Material handling, constructions and logistics, Vienna, Austria. Dr. Jakimovska presented her work on „An AHP/DEA method for measurement of the vehicle roadworthiness performance indexVRWPI” which was scheduled in the technical session „Constructions and Design Engineering”. The main topics of the conference were: Hoisting and Conveying Equipment, and Technologies; Construction and Mining Equipment and Technologies; Logistics and Intralogistics Systems; Constructions and Design Engineering; Maritime and Port Logistics.

4.2 Participation in information events

Attending information events in the EU is considered by the AComIn team as an extremely important activity as it enables the IICT seniors to establish new useful contacts, to build new consortia, to consolidate already existing working contacts and – last but not least – to promote AComIn and its achievements. There were three visits to information events in Project period 2, with Reports uploaded in the AComIn Team Area under *Reports*, *WP3*, *Participation in Information Events* (see Figure 2.

Two Information events were visited with the intention to gain new knowledge that facilitates the deployment of the Acoustic camera of AComIn Smart Lab. Another participation in an Information event was related to promotion of the 3D figures and tactile matrices, produced for the Exhibition “The battle of Pavia” – this was the contribution of AComIn to an event, associated to EXPO-2015 that blends Art and Technology in restoration in cultural heritage.

Dr. Volodymyr Kudriashov and **Dr. Iurii Chyrka,** 27-30 April 2015 - Copenhagen, Denmark. The AComIn post-docs Dr. Kudriashov and Dr. Chyrka took part in the "Acoustic Imaging and Noise Source Identification" course, organised by the Bruel & Kjaer company (manufacturer of the present AComIn acoustic camera equipment).The studied course has covered the main topics of sound data processing: LAN-XI hardware for acoustic data acquisition, planar and spherical beamforming, conventional and wideband holography, transient analysis of dynamic objects, NSI in wind tunnels and on wind turbines, moving source beamforming, and conformal mapping. Dr. Kudriashov and Dr. Chyrka met the producers of the Acoustic camera they use and shared their ideas for improvement some of the device characteristics by software upgrade and modifications.

Dr. Volodymyr Kudriashov, 4-9 May 2015 - Rome, Italy, “Roma Tre” University and METAMORPHOSE VI AISBL. Dr. Kudriashov participated in the “XXVII Edition of the “Distributed Doctoral School on Metamaterials” giving brief overview on latest results on cloaking. A poster presentation on “Improvement of Acoustic Noise Source Localisation” was given to increase visibility of results achieved using the AComIn SmartLab equipment. As well, technical performance of the Acoustic Camera was presented. Applicability of the Acoustic Camera to testing of newly developed cloaking materials had been advertised.

Prof. Galia Angelova, 24-26 May 2015, EXPO 2015 - Milan, Italy: A Promotional presentation about the Pavia Exhibition of digitised cultural heritage - a satellite event of EXPO 2015. The session with 5 presentations included a description of the exhibits (3D figures of medieval tapestry characters, tactile plates for people with impaired vision, eye-tracker and avatar). Prof. Angelova’s talk was related to the 3D figures and the tactile plates. A video prepared in the frames of the AComIn project was shown; it presented the phases of 3D printing for some figures. There was also a stand with printed figures and tactile matrices. Although the spoken language was Italian and Prof. Cantoni had to translate the English presentation of Prof. Angelova, the interest in the figures and especially the tactile plates was visible. The President of the Union of the Blind in Lombardy determined the 3D technology as “revolutionary” and comparable in its importance with the introduction of Braille.

Figure 2. Participation in Information events in Reporting period 2

5 ADDED VALUE OF ACOMIN NETWORKING TO THE STRENGTHENING OF THE IICT RESEARCH AND INNOVATION CAPACITY

In the AComIn Technical Annex (Part B, p. 10), the project performance is assessed in terms of:

(i) Research productivity,
(ii) Relevance to the socio-economic needs,
(iii) Human Resources,
(iv) Innovation impact,
(v) Social impact.

The activities of WP3 contribute mainly to the following indicators:

- *Research productivity* – because WP3 supports networking and provides opportunities for joint work with the international partners as well as funding for attendance in scientific events;
- *Human resources* – because WP3 contributes to the increase of "participation in scientific events abroad" and enables increase of the number of foreign researchers who visit the institute;
- *Innovation impact* – because WP3 supports invitations of foreign lecturers for organisation of higher quality Technology Transfer Events,
- *Social impact* – because WP3 supports invitations of visiting scholars who attend the Information Days and the Doors Open days. They give lectures that attract event larger number of participants to the AComIn Information events. Another aspect of WP3 support is that it enables travels of AComIn staff to Information events and makes possible attendances to e.g. Promotional events (at EXPO-2015) and the Exhibition "The Battle of Pavia".

Here we list the project networking achievements enabled by WP3 activities:

Papers published as result of WP3 activities: 52 after attendance in Conferences;
3 more prepared as joint work in Secondments and submitted to the AComIn-2015 conference

Seminar lectures delivered in IICT or abroad: 19 while implementing short incoming/outgoing visits;
6 during secondments;
66 delivered by IICT experienced researchers at Int. conferences and workshops attended via WP3

Visiting foreign scientists in WP3: 18 from 10 countries, 5 of them AComIn partners (note that 3 candidates for AComIn Post- docs were visiting scholars in Reporting period 1, and were successfully employed in AComIn Period 2)

Visiting lecturers for TT Workshops: 1, gave 4 lectures at a TT event with duration 2 days

Outgoing short visits supported by WP3: 16 to 6 countries, 13 of them to AComIn partners

Attendances to conferences and workshops: 33 experienced researchers participated in 43 international scientific events

Attendances in Information events: 4 visits to 3 events

List of WP3 Papers

Papers published as result of participation in scientific events

1. Paunova, E., K. Stoilova. Comparative Characteristics of Serious Games. MATHEMATICS AND EDUCATION IN MATHEMATICS, *Proceedings of the Forty Third Spring Conference of the Union of Bulgarian Mathematicians*, Borovetz, April 2–6, 2014, 186-191, ISSN: 1313-3330
2. Sellier, J.M., I. T. Dimov. The Wigner-Boltzmann Monte Carlo Method applied to electron transport in the presence of a single dopant. *Computer Physics Communications*, Volume 185, 2014, 2427–2435, Elsevier, ISSN: 0010-4655
3. Karastoyanov D., T. Penchev., Mobile Wireless Investigation Platform., International Conference on Manufacturing Science and Engineering (ICMSE 2014), 17-18 April 2014, Lisbon, Portugal, published in: *International Science Index* Vol: 08 No:04 Part IV, 554-559, eISSN 1307-6892
4. Penchev T., D. Karastoyanov., Experimental Study of Upsetting and Die Forging with Controlled Impact., International Conference on Manufacturing Science and Engineering (ICMSE 2014), 17-18 April 2014, Lisbon, Portugal, published in: *International Science Index* Vol: 08 No:04 Part IV, 529-533, eISSN 1307-6892
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6. Kandeva M., B. Ivanova , D. Karastoyanov, E, Assenova, Static and Dynamic Friction of Sphero-graphite Cast Iron with Sn Microalloy, *2nd Austrian Indian Symposium on Materials Science and Tribology*, May 26-29, 2014, Vienna, Austria, 84-88, ISBN 978-81-322-1656-8.
7. Sellier, J. M., M. Nedjalkov, I. Dimov, S. Selberherr: The Multi-Dimensional Transient Challenge: The Wigner Particle Approach. In: *Proc. of the 17th International Workshop on Computational Electronics (IWCE 2014)*, 2014, 119 – 120, ISBN: 978-2-9547858-0-6
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10. Todorov Y., M. Terziyska. State-Space Fuzzy-Neural Network for Modeling of Nonlinear Dynamics, In *Proceedings of International IEEE symposium Innovations in Intelligent Systems and Applications – INISTA 2014*, Alberobello, Italy, 2014, 212-217, ISBN 978-1-4799-3019-7.
11. Todorov Y., M. Doneva, P. Metodieva, I. Nacheva. An Intelligent Approach to Formulate the Contents of Novel Functional Food, In *Proceedings of International IEEE symposium Innovations in Intelligent Systems and Applications – INISTA 2014*, Alberobello, Italy, 2014, 98-103, ISBN 978-1-4799-3019-7.
12. Shahpazov G., L. Doukovska, V. Atanassova. Uncertainty Modeling in the Process of SMEs Financial Mechanism Using Intuitionistic Fuzzy Estimations, *Proc. of the International Symposium on Business Modeling and Software Design – BMSD'14*, 24-26 June 2014, Luxembourg, Grand Duchy of Luxembourg, 2014, 271-275, ISBN 978-989-758-032-1, DOI 10.5220/0005427002710275

13. Hadjiski M., L. Doukovska, S. Kojnov, V. Monov, V. Nikov, Significance of the predictive maintenance strategies for SMEs, *Proc. of the International Symposium on Business Modeling and Software Design – BMSD'14*, 24-26 june 2014, Luxembourg, Grand Duchy of Luxembourg, DOI 10.5220/0005427102760281, ISBN 978-989-758-032-1, 276-281, 2014.
14. Shahpazov V., L. Doukovska, D. Karastoyanov. Artificial Intelligence Neural Networks Applications in Forecasting Financial Markets and Stock Prices, *Proceedings of the International Symposium on Business Modeling and Software Design – BMSD'14*, 24-26 June 2014, Luxembourg, Grand Duchy of Luxembourg, 2014, 282-288, DOI 10.5220/0005427202820288, ISBN 978-989-758-032-1
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6 DEVIATIONS FROM SCHEDULE AND CONTINGENCY PLAN

AComIn has noticeable delay with the implementation of secondments.

The project started its active networking with some delay because little research results and achievements were available for reporting and exchange at the very beginning. For instance, the first results were reported at a conference abroad in month 7th (April 2013). Another reason for the delay is the lack of the AComIn equipment which appeared in months 12-15 (but the last two items came in June 2015 and even November 2015 for the Speech Lab). The delay in purchasing the Smart Lab devices implies delay of the research tasks that depend on the equipment; therefore the networking speeded up and became more active in the second project period especially in topics that deal applied research.

During the second reporting period (months 19-36) more secondments were implements (in total 12 outgoing and one incoming, that equals to 13 months secondments out of 36 months planned). Three more secondments will be implemented in the period October 2015 – January 2016, as the Work Package WP3 will run until 31 January 2013. However, in the Progress report for m. 36 we notice the under-spent planned secondments (and Networking in general) and include a detailed explanation about the reasons.

7 CONCLUSIONS

Concluding the project, we notice the excellent relationships with all partnering organisations who are willing to provide help and support, and do their best to deepen the joint research activities with the respective IICT teams. The remote contacts of the leading IICT specialists with their colleagues abroad are everyday practice. With the help of these contacts, the AComIn team achieved the remarkable progress in research and technology transfer, that is reported in the Deliverables

- D1.2 Strengthening the IICT Human Potential
- D2.4 Building User Communities
- D2.5 Final Exploitation Plan of SmartLab and the AComIn foreground and
- D4.3 Final Report on Innovation Capacity Building Activities.

The short two-way visits, implemented within WP3, helped to establish fruitful contacts with colleagues from the neighboring countries and brought new incoming post-docs and experienced professors. In this way WP3 contributed considerably to the innovation activities of AComIn.