AComIn:
Advanced Computing for Innovation

FP7 Capacity Programme
Research Potential of Convergence Regions

PROGRESS REPORT AFTER YEAR 2

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1. PROJECT OBJECTIVES FOR THE PERIOD

According to Annex I to the AComIn Grant Agreement, the specific project objectives are organised in the project Workplan into Work Packages (WPs) as follows:

WP1: Strengthening the IICT human potential
- Long-term employment of incoming post-docs;
- Short-term employment of experienced incoming researchers.

WP2: Setting up Smart Lab and building user communities
- Purchasing SmartLab devices and upgrading the IICT infrastructure;
- Building User Communities to transfer novel technologies.

WP3: Networking
- Networking (short visits and secondments) with leading EU centres;
- Participation in scientific events to disseminate project results;
- Participation in information events and exhibitions.

WP4: Development of Innovation Capacity in IICT and IP protection

WP5: Dissemination
- Supporting the project website;
- Organisation of scientific events;
- Organisation of technology transfer events;
- Dissemination to society in large.

WP6: Assessment by independent reviewers

WP7: Management

AComIn activities during the second project year addressed all the abovementioned packages except WP6. The milestone relevant to month 24 is M2: ***AComIn fully operational***. The expected results, most generally, are:
- Excellent post-docs who achieve high quality scientific results are employed at all positions and are fully integrated in the project workflow and the respective IICT departments;
- SmartLab equipment is procured, installed and actively used in research and technology transfer tasks;
- Established User Communities operate in several areas;
- Networking is implemented according to the DoW plan;
- Applications for patents are made based on research results obtained in the project;
- Dissemination tasks are performed according to the DoW plan.

2. WORK PROGRESS AND ACHIEVEMENTS DURING THE PERIOD

The results achieved during the second project year are listed below.

In WP1: Employment of incoming post-docs and incoming experienced researchers
- **6 post-docs have been employed with long-term contracts** in the second project year (Dr. Jean Michel Sellier, Dr. Stanislav Stoykov, Dr. Ivan Georgiev, Dr. Vladimir Kotev, Dr. Clemens Hofrether and Dr. Volodymyr Kudriashov).

They achieved excellent scientific results:

- o **Dr Jean Michel Sellier** elaborated the 'Wigner Monte Carlo' method - a novel approach to simulation of nano-processes (in a time dependent, full quantum fashion, including phonon scatterings) and next generation of nanotechnology devices. A new nano[3] Community is being organised at present. The method is applied to chemical systems;

- o **Dr Stanislav Stoykov** achieved novel results in isogeometric analysis for nonlinear dynamics of Timoshenko beams in collaboration with **Dr. Clemens Hofreither** and in modeling variable stiffness composite shells;

- o **Dr. Clemens Hofreither** achieved novel results in geometric multigrid methods. He also did research in interpolation and cubature of harmonic functions based on Radon projections and in stabilization of isogeometric methods for advection-dominated problems;

- o **Dr Ivan Georgiev** achieved novel results in studying and modeling of effective elastic properties of composite materials and also made numerical simulations of blood flow in Cerebral Aneurysms;

- o **Dr Vladimir Kotev** investigated robotised and biomedical systems, obtained new results and published papers in medical robotics, mechatronics and industrial engineering.

  All post-docs used the SmartLab equipment: the Visual Wall, the CT tomography, the 3D scanner and printer, as well as the thermo- and high-speed cameras. **Dr Volodymyr Kudriashov**, who was employed on 8 August 2014, started working with the acoustic holography.

- **There are 5 more selected post-doctoral applicants**, expecting EU working visas or conclusion of previous contracts – Dr. Stanislav Harizanov from Germany, Dr. Kristina Yakimovska from Skopje FYROM, Dr. Yuriy Chirka from Kiev and Dr. Olga Kanishcheva from Kharkov, Ukraine, as well as Dr. Alexey Balabanov from Sevastopol, Crimea. The progress in employments of incoming post-doctoral researchers is visible.

- **3 experienced researchers have been employed for a short period of one month** (Prof. Darina Dicheva, Prof. Hristo Dichev and Prof. Milena Dobreva). They performed joint research, delivered lectures, organised User Communities and transferred technologies to companies and representatives of other public organisations.

The internal reports about WP1 activities can be found at http://www.iict.bas.bg/acomin TEAM AREA, in Reports/WP1. Access: user `iict`, pass `acom1n`.

In WP2: Purchasing Smart Lab, building User Communities

- After accomplishing a Public Procurement procedure in year 1 (August 2013), when providers for 9 out of 12 devices were selected, another Public Procurement procedure was run in year 2 for purchasing the following four items: *(i)* 3D printer, *(ii)* Integrating Server (hardware as well as software for simulation), *(iii)* Speech Lab (devices), *(iv)* Speech Lab (delivery and installation of isolation). About 98% of the planned budget for purchasing the equipment is spent, 2% are contracted and the payments it will be finalised in a few weeks.

- Activities in Building User Communities speed up after the equipment installation. Innovation-related Workshops and Technology Transfer (TT) Seminars were organised in year 2 in the following AComIn-related topics:

  Industrial Mathematics

  - o TT Seminar "Mathematics as Technology" (December 19, 2013)

- o TT Seminar "Ultimate numerical methods for solving problems in modern physics and emerging technologies" (August 21, 2014)

Image and Video Processing
- o TT seminar "Video segmentation: applications to medical imaging and life-logging data" (January 16, 2014)
- o TT seminar "Thermography and its Applications" (February 11-13, 2014)

3D Technologies in Cultural Heritage
- o TT seminar "Scanning and Digitization" (March 17, 2014)
- o TT seminar "3D Visualization of Cultural Heritage" (September 10, 2014)

Intelligent Management of Digital Content
- o TT seminar "Introduction of game elements in training systems and education (July 3, 2014)
- o TT seminar "Challenges connected with the use of resources of large digital libraries in education and civil science" (July 9, 2014)

Robotics and Embedded Systems
- o TT seminar "Robotics and Innovations" (September 18–19, 2014)

Information about the SmartLab devices can be found at http://www.iict.bas.bg/acomin/smartLab.html. User-oriented activities are listed at http://www.iict.bas.bg/acomin/user_communities.html. Some of the User Communities are closely related to the SmartLab equipment:

- CT tomography (for identifying internal casting defects, 3D microstructure studies of composite samples and other new materials etc.);
- thermocamera (with thermography for stretching materials, welding processes, electrical furnaces etc.);
- laser particle nano sizer (in special mixture processes, temperature Taman furnace, etc);
- high speed camera (for rocket engine design and testing, plastic and elastic deformations etc.).

In WP3: Networking activities and events
- The IICT AComIn team had useful exchange with the project partners, including the newly associated partner Prof. Johannes Kraus (from the Department of Mathematics, University of Duisburg-Essen, Germany). In total, 17 visits were exchanged with the partnering sites:
  - o 9 visits type "secondment"
  - o 8 short visits (1 to Örebro, 4/2 to/from Glasgow, 1 from Kaiserslautern);
- More than 50 participations in International Conferences and Workshops were implemented, with accepted papers acknowledging AComIn;
- AComIn team members attended International Exhibitions: the European Data Forum in Athens (March 2014) with an exhibit and the International Technical Fair in Plovdiv (September 2014) with an AComIn stand;
- Multiple (21) short visits of foreign guests were implemented in year 2 for performed joint research, delivering lectures to AComIn events and sharing experience in AComIn-related topics.

The list and internal reports about the activities can be found at http://www.iict.bas.bg/acomin TEAM AREA, in REPORTS/WP3. Access: user `iict`, pass `acomln`.

In WP4: Development of Innovation capacity

- Six IICT projects, inspired or related to AComIn topics, were running in year 2 with funding of the Operational Programme Competitiveness. They all support closer cooperation between IICT scientists and Bulgarian SMEs;

- a Bulgarian Patent Application: Karastoyanov D., I. Yachev, K. Hinov, Y. Balabosov *Braille display,* Application No 111638, 29.11.2013 is prepared for PCT submission (supported by AComIn). The proposed special tactile matrix has a simple structure and easy conversion technology with improved static, dynamic and energy performance. The AComIn SmartLab devices were used to improve the design of the matrix;

- another Bulgarian Patent Application called *Nail* was registered at 18 September 2014. The application concerns a nail with a special shape – it has three spherical surfaces and three edges. The nail cross section forms the so called Reloe triangle, providing the nail with a greater resistance to collapse of the structure, a greater security of wooden buildings as well as a greater resistance to the transverse force actions. The AComIn SmartLab devices were used to test the nail and prove its innovative features. It is planned to extend the patent application to PCT in 2015.

In WP5: Dissemination activities and events

- AComIn has been recognised as one of the most important FP7 projects that develop research capacity in Bulgaria:
  - the President of the Republic of Bulgaria Mr Rossen Plevneliev visited IICT on 10 February 2014;
  - Mr. Wolfgang Burtscher, Deputy Director General of DG Research and Innovation, European Commission visited IICT on 17 February 2014;
  - a Honorary Diploma was awarded to AComIn by Prof. Anelia Klisarova, Minister of Education and Science of Republic Bulgaria on 18 February 2014.

- The following scientific events were organised in year 2 with partial AComIn support:
  (i) Int. Workshop "Autonomic Computing and Automatic Control in Computer Systems" (ACACCS'13, October 2013);
  (ii) Workshop "ICT for new materials and nanotechnologies" (NewNano'13, October 2013);
  (iii) Int. Workshop "Advanced Control and Optimisation: Step Ahead" (ACOSA'14, May 2014);
  (iv) International Workshop on Biometrics (BIOMET'14, June 2014);
  (v) Int. Workshop on Control in Transportation Systems (CTS'14, September 2014);
  (vi) Int. Conference "Numerical Methods and Applications" (NMA'14, August 2014);
  (vii) Int. Conference "Artificial Intelligence: Methodology, Systems, and Applications" (AIMSA'14).
  Three of these events published Proceedings in Springer's Lecture Notes Series: BIOMET 2014 and NMA 2014 in Lecture Notes in Computer Science; AIMSA 2014 in Lecture Notes in Artificial Intelligence.

- 101 Papers and monographs are published in project months 19-24 (see also section 8):
  - 25 in journals and established series (in addition 21 are in print),
  - 54 in Proceedings of recognised International Conferences,
  - 2 book chapters are in print,
  - 2 monographs published by the Publishing House of the Bulgarian Academy of Sciences,
  - 2 Workshop Proceedings (of NewNano'13 and ACOSA'14 with 23 peer-reviewed papers) are published by the Publishing House of the Bulgarian Academy of Sciences,

- o Selected papers of the workshop CTS'14 held in September 2014 will appear in the Journal Cybernetics and Information Technologies.
- Technology Transfer events are organised in order to spread out know-how to User Communities:
  - o TT Seminar "Mathematics as Technology" (December 19, 2013);
  - o TT seminar "Video segmentation: applications to medical imaging and life-logging data" (January 16,2014);
  - o TT seminar "Thermography and its Applications" (February 11-13, 2014);
  - o TT seminar "Scanning and Digitization" (March 17, 2014);
  - o TT seminar "Introduction of game elements in training systems and education (July 3, 2014);
  - o TT seminar "Challenges connected with the use of resources of large digital libraries in education and civil science" (July 9, 2014);
  - o TT Seminar "Ultimate numerical methods for solving problems in modern physics and emerging
  - o technologies" (August 21, 2014);
  - o TT seminar "3D Visualisation of Cultural Heritage" (September 10, 2014);
  - o TT seminar "Robotics and Innovations" (September 18–19, 2014).
- Two issues of the AComIn Newsletters were published in year 2: Newsletter 3 (October 2013 - March 2014) and Newsletter 4 (April-September 2014), see http://www.iict.bas.bg/acomin/e-newsletters.html
- Doors Open Days were held on 28-29 March 2014 with more than 120 visitors who came to see the SmartLab equipment in work and to discuss with AComIn members its possible applications.

Further dissemination activities are:

- Project website (http://www.iict.bas.bg/acomin/index.html) has been developed and regularly updated. The public part of the website contains information to raise the awareness of the general public for the project objectives, activities and results. The "Team zone" of the website is an important element of the project management infrastructure since it supports the working communications among the project staff members.
- Project leaflets and posters are disseminated regularly in English and Bulgarian;
- Project leaflets, newsletters and posters were disseminated in English and Bulgarian at the Plovdiv Fair during the participation of AComIn;
- National Bulgarian TV channels visited IICT together with the President of Bulgaria and broadcasted News;
- The National Bulgarian TV Channel 1 broadcast News about the Doors Open Days organised by AComIn (29 March, 2014);
- The Bulgarian Newspaper АЗБУКИ (Alphabet) published an article about AComIn and SmartLab in its No. 15, April 2014;
- A film about the post-docs and the incoming experienced scientists "AComIn: the people" has been made (one of the three movies that will be developed within AComIn).

In WP7: Management

- The 1st reporting period of AComIn (month 18) has been successfully completed;
- A new partner in Advances Computing joined the team: Prof. Johannes Kraus - Department of Mathematics, University of Duisburg-Essen, Germany;
- National co-financing of AComIn is received by the Bulgarian Ministry of Education and Science that will facilitate the involvement of PhD students in the AComIn activities;

- A new part-time manager was employed on 1 July 2014 in AComIn (Ms Desislava Ivanova with a BSc and MSc degree in Marketing and Management obtained at the FernUniversität in Hagen);
- The everyday project management runs smoothly, including the management of the Public Procurement procedures.

3. DELIVERABLES AND MILESTONES

The following nine deliverables are planned for the second project year:

Month 18 (end of Reporting period 1):
- D1.1 Strengthening the IICT Human Potential
- D2.2 Infrastructure Upgrade and Integration
- D2.3 Building User Communities
- D3.1 Networking
- D4.2 Innovation Capacity Building Activities
- D5.1 Dissemination Activities
- D7.4 Input for EC Review in month 18

Month 24:
- D7.5 Steering Committee Conclusions regarding year 2 (with restricted access)
- D7.6 Strategy for Sustainable Development of the Institute of Information and Communication Technologies

All these deliverables were submitted to the European Commission. Excluding D7.5, they are public reports and were also uploaded at the project site http://www.iict.bas.bg/acomin/deliverables.html.

For the end of year 2, the following milestone is relevant: M2 (month 18) ***AComIn fully operational***. The results of AComIn activities connected to this milestone have been achieved to large extent (see also section 6. Deviation from schedule).

4. PROJECT MANAGEMENT DURING THE PERIOD

According to the project Technical Annex, the AComIn management structure consists of *Steering Committee*, *Executive Board* and *Stakeholder Committee*.

During the second project year the management bodies had their meetings as follows:
- The *Steering Committee* had meetings in October 2013 and October 2014, dealing with the strategic project management and assessment of project achievements;
- The *Executive Board* had 7 face-to-face and 3 virtual meetings on monthly basis for monitoring and coordination of AComIn activities. Discussions of post-doc applications and votings about approval of canidates often took place virtually. Draft budgets of WP5 events were also discussed and approved by mail. Each meeting was summoned by the Project Coordinator with pre-announced agenda; the discussions and decisions were presented in the meeting minutes.

- The *Stakeholder Committee* had a planned meeting in July 2014 (but it was postponed because most of the members met on 28-29 March 2014 at the AComIn Doors Open Days, and on 30 September 2014 at the Innovation seminar of BAIT in Plovdiv – see section 6. Deviation from schedule).

5. USE OF RESOURCES

The spending and reporting of AComIn financial resources have been divided into three periods:
- Period 1: months 1-18;
- Period 2: months 19-36;
- Period 3: months 37-42.

In this section we present the use of resources at month 24, i.e. an intermediate status within period 2.

All direct AComIn costs for months 1-24 are summarised in Table 1.

	WP1	WP2	WP3	WP4	WP5	WP6	WP7	Total €
Personal costs	251748.13	52266.70	2880	9639.86	19915.70	0	64262.55	400712.96
Equipment	0	926607.24	0	0	0	0	0	926607.24
Travel	2817.92	84.49	197094.70	1620.40	44293.70	0	3949.24	249860.46
Consu-mables	9859.11	3328.79	109.42	376.75	2791.68	0	2573.66	19039.40
Other	72.20	0	682.04	440.24	120	0	121.89	1436.37
Subcont-racting	0	0	200.80	3931.51	23960.57	0	6000	34092.88
Total €	264497.36	982287.22	200966.96	16008.76	91081.67	0	76907.34	1631749.31

Table 1. Direct costs in euro per Work Packages, AComIn month 24

In terms of major AcomIn budgets, resources are used as shown in Table 2 and Figure 1.

Major AComIn budgets	Utilised by m. 24 (€)	Planned in DoW (€)	%
1. Personnel	400 713	1 081 620	37%
2. Equipment	926 607	950 273	97.5%
3. Networking, Travel	205 566	614 264	33,5%
4. Dissemination, Travel	44 294	118 000	37.5%
5. IPR protection	3 640	30 000	12%
6. Consumables	19 039	89 000	21.4%
7. Subcontracting	34 093	134 500	25.3%

Table 2. Use of resources for the major project budgets, AComIn month 24
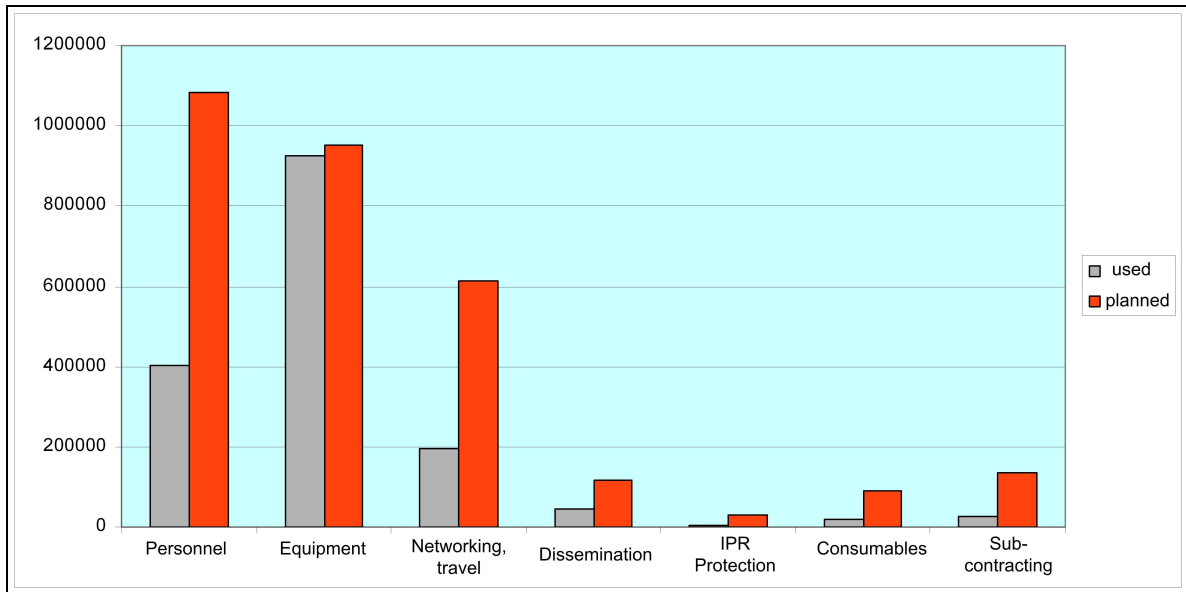
Figure 1. Use of resources for Recruitment of staff at month 24 cf. planned Personnel for periods 1&2

In terms of man-months, Table 3 and Figure 2 show use of resources for major staff categories.

Major staff categories for months 1-36	Utilised by m. 24 man-months	Planned by m. 36 man-months
1. Incoming postdocs, long-term employments	64	168
2. Incoming experienced researchers, short-term employments	9,2	34
3. Bulgarian team – experienced researchers, legal experts, Smart Lab technicians etc. including management staff in WP7	61 incl. 23 in WP7	140 incl. 40 in WP7

**Table 3**. Use of person-months in AComIn by month 24
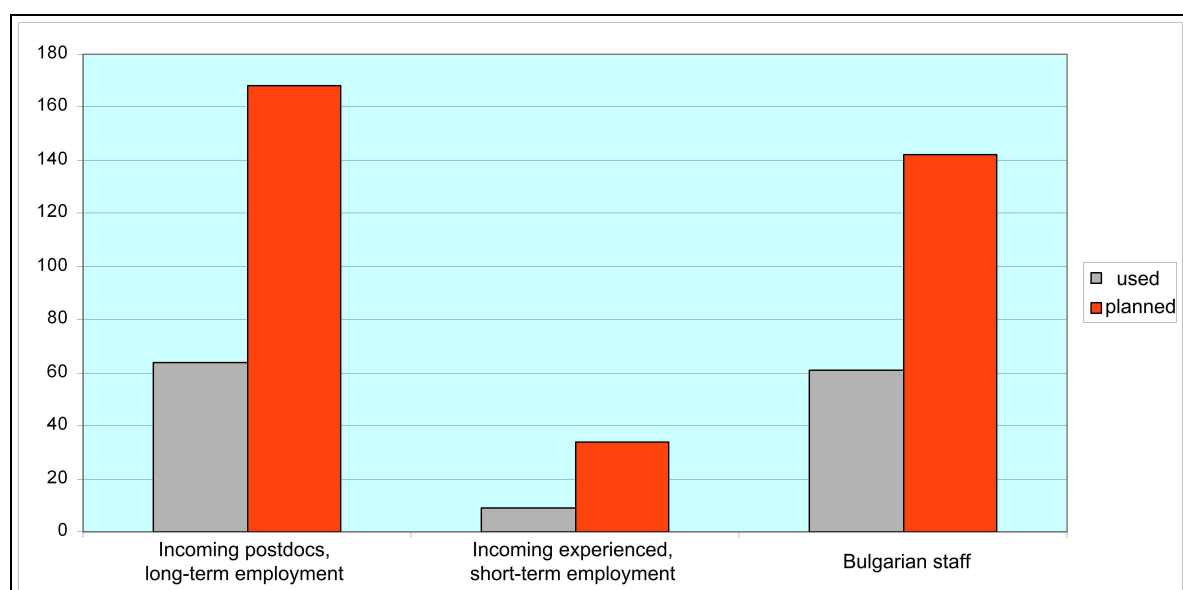
Figure 2. Recruitment of AComIn staff at month 24 cf. planned person-months for m. 1-36

Networking with partners via secondments is a budget that was relatively unspent at m. 18. A contingency plan was presented then how to cope with the delay. The implementation of this plan started and some 9 seconments have been implemented during the last 6 months. Figure 3 illustrates the number of planned secondments (8 months outgoing seconments and 2 months incoming) with the project partners ordered as follows:

- Glasgow: University of Glasgow and Gold Standard Simulations Ltd. UK,
- ITWM & UDE: Fraunhofer Institute of Industrial Mathematics Keiserslautern and Department of Mathematics, University of Duisburg-Essen, Germany;
- STI/VUA: STI International and its member Free University of Amsterdam, the Netherlands,
- Pavia: University of Pavia, Italy,
- Örebro: University of Örebro, Sweden,
- Crete: Technical University of Crete, Greece.

The blue columns in Figure 3 show the number of outgoing and incoming secondments, implemented for each partnering site by m. 24.
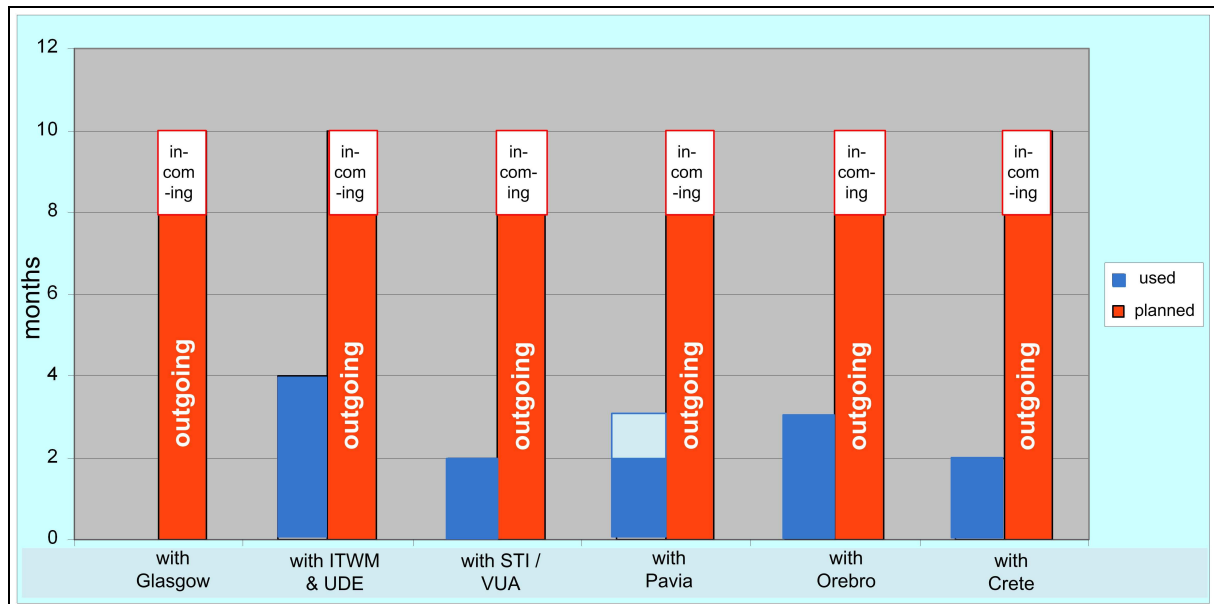
Figure 3. Status of secondments implemented by month 24 cf. planned secondments to/from partnering sites in six project topics

6. DEVIATIONS FROM SCHEDULE

In WP1, seven post-docs have been employed in the project so far. There is still some delay in long-term recruitments of high quality researchers, especially post-docs with experience and achievements in the AComIn topics. However, the contingency measures (quite active search of applicants) brought to the project five excellent candidates who will be employed in December 2014 or January 2015: Dr. Stanislav Harizanov from Germany, Dr. Kristina Yakimovska from Skopje FYROM, Dr. Yuriy Chirka from Kiev and Dr. Olga Kanishcheva from Kharkov, Ukraine, as well as Dr. Alexey Balabanov from Sevastopol, Crimea. In this way we expect to fully use the available funding for employments of post-docs. These recruitments will have significant impact on the IICT human potential.

In WP2 there was certain delay in purchasing two items of the Smart Lab equipment, implying further delay in their installation and real exploitation. Now all equipment is installed and the AComIn team started building two new User Communities: in Advanced transportation systems and Speech processing.

In WP3 there is delay in the implementation of secondments due to the quite busy schedule of both the IICT seniors and the international partners (it takes longer to plan a secondment). The project team is focused on the issue and there are plans to speed up the implementation of secondments. First successful steps in this direction have been made during months 19-24.

The activities in WP4 and WP5 have been performed according to the project Workplan. There was a relatively minor change in the schedule of the 2nd Stakeholder Committee meeting that was originally planned for July 2014. It turned out that such a meeting will be more fruitful if it takes place during the spring of 2015, when the AComIn team has its own applied results and will make meaningful demonstrations with the Smart Lab equipment. Moreover, most of the Stakeholder Committee members met on 28-29 March 2014 at the AComIn Doors Open Days, and on 30 September 2014 at the Innovation seminar of the Bulgarian Association for Information Technologies, held within the Technical Fair Plovdiv where AComIn was presented by the project coordinator. In this way the AComIn Executive Board made the decision to postpone the 2nd Stakeholder Committee meeting by 7-8 months.

7. RISK ANALYSIS AND CONTINGENCY ACTIONS

A moderate risk for the achievement of planned project results (by decreasing the volume of achievements) lays in underspent budgets for
- Employment of incoming researchers;
- Travels (especially secondments);
- Payments to IICT scientists (due to lack of sufficient capacity to organise high-quality activities of Bulgarian researchers that are worth supporting).

There is a *minor risk* of decreasing the quality of the research performance by lowering the requirements to project team members in order to spend the budget.

The following *contingency actions* are considered:
- To involve IICT doctoral students in AComIn tasks given the national co-financing that was provided by the Bulgarian Ministry of Education and Science especially for this purpose. In project year 3, some of these young people will be experienced researchers (after the defense of their theses) and will take part in the core AComIn activities;
- To advertise more actively the potential of AComIn equipment in order to attract further post-docs (considering also raising awareness visits at the neighbouring Balkan countries);
- To follow strictly the contingency plan for implementation of secondments and fix them months in advance in the visitors' and hosts' schedules;
- To monitor and consistently evaluate the quality of participants' performance by the project management bodies, in order to keep up the standards.

8. LIST OF PAPERS PUBLISHED IN MONTHS 19-24

The following 74 papers and 2 monographs were published in project months 19-24 (after the delivery of AComIn Reports at month 18). Another 25 papers were accepted for publishing in project months 19-24, most of them will have DOIs.

Published papers:

1. Sellier, J.M., M. Nedjalkov, I. Dimov, and S. Selberherr. A comparison of Approaches for the Solution of the Wigner Equation. Mathematics and Computers in Simulation Vol. 107, January 2015, Pages 108–119, 2014, DOI: 10.1016/j.matcom.2014.06.001.

2. Sellier, J.M. and I. Dimov. The many-body Wigner Monte Carlo Method for time-dependent Abinitio quantum simulations, Journal of Computational Physics, Vol. 273, pp. 589-597, (2014) http://dx.doi.org/10.1016/j.jcp.2014.05.039

3. Sellier, J.M. and I. Dimov. A Wigner Approach to the Study of Wave Packets in Ordered and Disordered Arrays of Dopants, Physica A, Elsevier, Vol. 406, pp. 185-190, 2014, DOI: 10.1016/j.physa.2014.03.065

4. Sellier, J.M. and I. Dimov. A Wigner Monte Carlo Approach to Density Functional Theory, Journal of Computational Physics, Elsevier, Vol. 270, pp. 265-277, 2014. ISSN: 0021-9991. DOI: 10.1016/j.jcp.2014.03.065

5. Sellier, J.M., M. Nedjalkov, I. Dimov, S. Selberherr. A benchmark study of the Wigner Monte-Carlo method, Monte Carlo Methods and Applications, De Gruyter, Vol. 20, Issue 1, pp. 43-51, 2014, DOI: 10.1515/mcma-2013-0018

6. Kraus, J., M. Lymbery and S. Margenov. Auxiliary space multigrid method based on additive Schur complement approximation. Numerical Linear Algebra with Applications, Vol. 21 issue 6, 2014, DOI 10.1002/nla.1959, accessible at onlinelibrary.wiley.com/doi/10.1002/nla.1959/abstract

7. I. Georgiev, S. Margenov, Semi-coarsening AMLI preconditioning of anisotropic trilinear FEM Systems, Computers and Mathematics with Applications, DOI: 10.1016/j.camwa.2014.07.030 (published online 15.09.2014).

8. Karastoyanov D., and Vl. Kotev. Electromagnetic Microdrives for Braille Screen: Control and Circuit Testing, International Journal of Materials Science and Engineering, vol. 3, (1), March 2014, pp: 1-6, ISSN 2315-4527, doi: 10.12720/ijmse.3.1.1-6.

9. Kotev Vl., D. Karastoyanov and P. Genova. Application of the Spatial Mechanisms in Bioreactors: Design Concept., International Journal of Materials Science and Engineering, vol. 3(1), March 2015, pp. 82-85, ISSN 2315-4527, doi: 10.12720/ijmse.3.1.1-6.

10. Kraus, J., R. Lazarov, M. Lymbery, S. Margenov, L. Zikatanov, Robust Preconditioning of Darsy Problem for Highly Heterogeneous Media, Numerical Linear Algebra with Applications, Volume 21, Issue 3. May 2014, pp. 375-398. DOI: 10.1002/nla.1876, IF: 1.202

11. Roeva O., Fidanova S., Parameter Identification of an E.coli Cultivation Peocess Model Using Hybrid Methaeuristics, J. of Metaheuristics, Vol 3(2), ISSN 1755-2176, 2014, 133 – 148. DOI: 10.1504/IJMHEUR.2014.063143

12. 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. In: G. Agre et al. (Eds.): AIMSA 2014, Springer Int. Publ. Switzerland, Lecture Notes in Artificial Intelligence 8722, 2014, pp. 92–103. DOI 10.1007/978-3-319-10554-3_9

13. Petia Koprinkova-Hristova, P. and K. Alexiev. Dynamic Sound Fields Clusterization using Neuro-Fuzzy Approach. In: G. Agre et al. (Eds.): AIMSA 2014, Springer Int. Publ. Switzerland, Lecture Notes in Artificial Intelligence 8722, 2014, pp. 194–205. DOI 10.1007/978-3-319-10554-3_19

14. Fidanova S., Paprzycki M., Roeva O., Hybride GA-ACO Algorithm for a Model Parameter Identification Problem, In proc. of FedCSIS 2014 conference, pp. 413 -420, IEEE catalog number CFP1485N-ART, DOI 10.15439/2014F373.

15. Mustakerov I., D. Borissova. One-dimensional cutting stock model for joinery manufacturing. In Proc. Advanced Information Science and Applications – Volume I, 18th Int. Conf. on Circuits, Systems, Communications and Computers (CSCC 2014), July 17-21, 2014, Santorini Island, Greece, ISBN: 978-1-61804-236-1, pp. 51-55. DOI: 10.13140/2.1.2845.5049

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