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# **AComin: Advanced Computing for Innovation**

**FP7 Capacity Programme  
Research Potential of Convergence Regions**

**D7.7  
Input for EC Review in Month 36**

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## EXECUTIVE SUMMARY

This Deliverable contains general information about the performed activities and the results, achieved in the second reporting period of AComIn (project months 19-36, 1 April 2014 – 30 September 2015). It presents briefly the project achievements during the reporting period for Work Packages WP1-WP5 and summarises the information presented in the following Deliverables:

- D1.2 Strengthening the IICT Human Potential
- D2.4 Building User Communities
- D2.5 Final Exploitation Plan of SmartLab and the AComIn foreground
- D3.2 Networking
- D4.3 Final Report on Innovation Capacity Building Activities
- D5.2 Dissemination Activities
- D5.3 Int. Conference “Advanced Computing for Innovation”

AComIn performance is assessed in terms of the measurable performance indicators, defined in the project Technical Annex, where the baseline results of IICT-BAS in 2011 are presented. It is clearly seen that in 2013-2015 the number of high quality papers published by IICT researchers as well as the number of contracts with companies increased significantly.

Deviations from the project schedule are outlined. Having in mind that the performance indicators are achieved, we conclude that these deviations are insignificant and AComIn has achieved its objectives and technical goals with relatively minor deviations.

## Document Information

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<b>Summary</b>	Deliverable D7.7 generalises information about the performed activities and the results, achieved during the second reporting period of the project AComIn (months 19-36, 1 April 2014 – 30 September 2015). The deliverable text is intended to serve as an input for the project review in month 36.	
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## 1 INTRODUCTION

AComIn is a project for building research capacity. As such, it has no predefined objectives to achieve certain specific research of technological target; rather, its success is measured by comparing the research productivity at the end of the project to a predefined baseline (IICT-BAS performance for 2011 in this case).

Here we list the Performance indicators defined in the Technical Annex of AComIn in August 2012. They are the baseline for assessment of the AComIn performance:

- ✓ **Research productivity:** *increase of the number and quality of scientific publications by 10%, based on the IICT Annual Report for 2011;*
- ✓ **Relevance to the socio-economic needs:** *the number of contacts with industrial, governmental and NGO users and clients will be increased by 15% via contracts, established during AComIn. The number of joint development initiatives will be increased by at least 8-10 new initiatives starting within AComIn. As a baseline the number of IICT applied projects and contracts in 2011 will be used: 5 projects, funded by the Bulgarian SMEs Promotion Agency and 10 contracts for industrial research, funded by Bulgarian companies.*
- ✓ **Human Resources:** *the number of recruited foreign incoming researchers will be increased by 4 and the number of repatriated Bulgarian researchers by 3 (according to the positions planned for long-term employment). The number of defended PhD theses will be increased by at least 20% (in 2011 3 PhD theses were defended in IICT).*
- ✓ **Innovation impact:** *The number of patent applications, submitted within AComIn, will be at least 4. The software licenses will be at least 3. The User Communities will comprise hundreds of industrial experts.*
- ✓ **Social impact:** *There will be hundreds of visitors at the Doors Open Days and attendees at the Information Days and Stakeholders meetings. There will be dozens of media reactions to the AComIn dissemination efforts.*

### 1.1 WP1: Strengthening the IICT Human Potential

Recruitment of incoming experienced scientists is one of the major project objectives; it is an instrument for strengthening the IICT research capacity. Deliverable D1.2 considers in depth the results achieved by the incoming post-docs in Reporting period 2. The incoming experienced researchers achieved remarkably good results, in some cases even breakthrough and opening the door to radically new technologies.

During the first reporting period of AComIn (1 October 2012 – 31 March 2014) six incoming experienced researchers with less than 10 years of scientific experience (post-docs) have been recruited in the AComIn areas of interest: *Advanced Computing* and *Language and Semantic Technologies*. The number of person months, utilised for their employment, is 44.4.

During the second reporting period of AComIn (1 April 2014 – 30 September 2015) ten incoming post-docs have been employed who worked (together with post-docs recruited earlier) in the topics *Advanced Computing*, *Language and Semantic Technologies*, *Signal and Image Processing* and *Optimisation and Intelligent Control*. In total fifteen incoming post-docs worked in AComIn in

Reporting period 2. The number of person months, utilised for their employment is 105.4. For the whole project duration (1 October 2012 – 30 September 2015) the number of utilised person-months for post-docs is 150 (out of 168 planned person months).

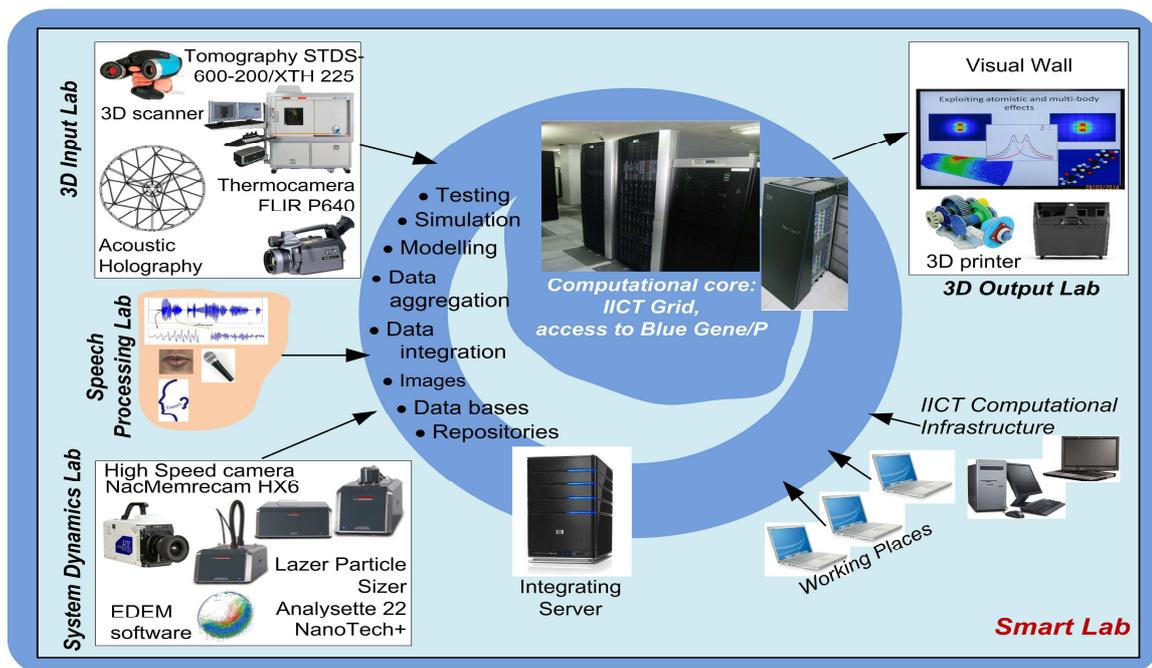
Short-term employments were planned for experienced incoming researchers with more than 10 years of experience. D1.2 presents the employments of five visiting professors for 8,4 person months in total.

D1.2 lists 82 papers, authored by researchers recruited via AComIn during project months 19-36 and published in peer reviewed scientific journals and conference proceedings (14 of these 82 papers are accepted and in print on 30 September 2015). Some 27 of the papers have Thomson Reuters Impact factor and 23 have SJR Indicator.

**Deviations from schedule in WP1:** The delay in recruiting experienced researchers in Reporting period 1 was fully compensated in Period 2 when 10 new post-docs were employed. It is agreed with the European Commission that WP1 will run by 31 January 2016. In this way the planned Person Months for incoming experienced scientists will be fully utilised.

## 1.2 WP2: Infrastructure Upgrade by Purchasing Smart Lab and Building User Communities

The AComIn equipment, called SmartLab, is viewed as advanced 'periphery' (in a broad sense) to the High-Performance Computational Core of the institute (see Fig. 1). IICT needed modern devices to acquire data about objects and processes that might be of interest for the Bulgarian high-tech industry. These devices ensured the 'data autonomy' of IICT (flow of real-world data for IICT research tasks) as they enabled highly innovative scientific activities related to material sciences, energy, health, industrial control and optimisation etc. Thus IICT extended significantly its research expertise, tackling a broad range of advanced tasks, and developed innovation capacity in hot ICT areas.



**Figure 1.** SmartLab with the original devices purchased at AComIn Tenders 1, 2 and 3

After three Public procurement procedures, conducted in the period 1 February 2013 – 9 November 2014, IICT-BAS purchased the SmartLab devices as specified in the Technical Annex (Figure 1). In Reporting period 2 (project months 19-36) the only WP2 Tasks, that is running, deals with the organisation of User Communities.

Users in AComIn are experts or organisations in need of novel knowledge in areas covered by the IICT competences. User Communities are viewed as dynamically-growing expert groups that disseminate the AComIn results to the innovation-absorbing Bulgarian companies and institutions in the Public Sector.

At the end of the first reporting period (March 2014) there were two operating User Communities:

- “*3D input/output*” with two distinct sub-communities of Users who are interested respectively in:
  - primarily in the object shapes (i.e. *3D scanning and printing*) and
  - in the modeling of 3D microstructure (i.e. *the tomography*).
- “*Microstructure dynamics*” for studying changes in the microstructures of various materials and objects when different processes affect them.

Several groups of AComIn “supporters” in various areas were formed:

- *Thermography,*
- *Medical imaging and biometrics,*
- *Industrial mathematics* and
- *Intelligent management of digital and electronic content.*

During Reporting period 2, there were five active User Communities: in

- “Intelligent Management of Digital Content”,
- “Advances in 3D Technologies”,
- “Industrial Mathematics”,
- “Advances in Material Analysis”, and
- “Mechatronics and Industrial Applications”.

Some 13 Technology Transfer Seminars were organised for dissemination of know-how in the respective areas (and demonstrations of relevant SmartLab equipment). More than 400 participants in total attended the Technology Transfer events. Moreover, Know-How Transfer Meetings were held in the following areas:

- Speech processing with the AComIn Speech Lab and
- Acoustic Imaging with the AComIn Acoustic Holography.

**Deviations from schedule in WP2:** A major deviation was the slow purchase of 3 positions in the SmartLab equipment list (the last installation – of the AComIn Speech Lab – was completed with one year delay). However all devices are in use today; the interest to the User Communities shows that AComIn achieves its objectives to attract Bulgarian high-tech industry. It is agreed with the European Commission that WP2 will run by 31 January 2016. In this way the activities related to User Communities will continue four more months which will enable establishing of new contacts with companies.

Further details about the activities, related to User Communities, as well as about the Exploitation plan of SmartLab and the AComIn foreground can be found in Deliverables D2.4 and D2.5.

### 1.3 WP3: Networking

The following networking activities with the partnering organisations were implemented in Reporting period 2:

- 12 outgoing secondments to 5 partnering organisations, with total duration about 12 months;
- One incoming secondment with a partner, with duration of one month;
- 18 short visits were exchanged with partners: 5 incoming and 13 outgoing;
- 4 international partners attended the Steering Committee meeting after year 2 in October 2014.

In this way the cooperation with the partnering teams was relatively active (35 visits were exchanged).

The following outgoing and incoming travels as well as event participations were implemented:

- 57 participations in International scientific conferences, almost in all cases for presentation of accepted papers. 33 experienced researchers participated in 43 international scientific events (42 of them peer-reviewed conferences and workshops);
- 5 participations in an Exhibition, to promote AComIn Achievements in 3D modelling;
- 13 incoming short visits were organised, mostly for leading scientists who gave lectures, established connections, attended the Doors Open Days on 17-18 April 2015 and recommended AComIn to post-doctoral applicants in their respective country;
- 3 outgoing short visits of IICT experienced scientists were implemented, in order to write joint papers, and give invited talks at seminars;
- 4 visits of IICT experienced researchers to 3 information events in the EU were implemented.

In total, the researchers travelling via the AComIn networking schemes in period 2 delivered 66 presentations at various scientific events and 52 papers were published in the respective event Proceedings.

**Deviations from schedule in WP3:** The major deviation is the slow implementation of the secondments with the international partners. Having in mind the established practice for distant work and skype conversations in computer science, we can say that this deviation does not prohibit the efficient RTD cooperation with the partnering teams and has no significant impact on the AComIn tasks. Further details about Networking activities can be found in D3.2.

### 1.4 WP4: Innovation Activities

AComIn proposed to IICT in Reporting period 2 the Deliverable D7.6 “Strategy for Sustainable Development of the Institute of Information and Communication Technologies” (see <http://iict.bas.bg/acomin/deliverables.html>) – month 24. It contains:

- Measures for implementing the IICT Sustainable Development Strategy as well as
- Indicators for Successful Implementation of IICT’s Sustainable Development Strategy.

In terms of innovation activities, the WP4 results can be reported as follows:

- 4 Patent applications were submitted after project month 19; 2 to WIPO and 2 to the Bulgarian patent office (BPO). Four other applications are in preparation including one for WIPO;
- 6 projects were completed in the Competitiveness Operational Programme, coordinated by Bulgarian SMEs which collaborate with IICT as a research partner providing innovation;

- 8 agreements for contracted research were signed, 7 of them with companies;
- 14 projects for joint developments were started, where the AComIn team contributed pilot studies and/or prototypes, 3 of them with companies;
- 2 projects for pilot developments in international collaborations with Universities in Germany and Italy were completed;
- 4 contacts were established with Business Representatives, 2 of them subsidiaries of large international industry, who are potential collaborators in future joint activities.

Deliverable D4.3 contains further details about the innovation-related activities in WP4.

## 1.5 WP5: Dissemination Activities

During Reporting period 2 the dissemination activities were performed according to the project planning:

- The web-site of the project is regularly updated;
- The project results were disseminated to a broad scientific audience within 9 scientific events that received partial AComIn support: 4 of them belong to world-wide renowned series of International Conferences - Large Scale Scientific Computations (LSSC-2015), Recent Advances in Natural Language Processing (RANLP-2015), Artificial Intelligence: Methodology, Systems, Applications (AIMSA-2014), and Numerical Methods and Applications (NMA-2014). The other 5 events are Workshops oriented mainly towards Bulgarian academic and industrial communities;
- 13 Technology Transfer Seminars were organised;
- A non-scientific Stakeholder meeting was organised in July 2015;
- An Information Day was organised along with the Third Steering Committee Meeting;
- The Doors Open Days were organised on 17-18 April 2015 as a wide-scale dissemination event;
- 2 issues of the AComIn (e-)Newsletter were published in English and Bulgarian. Leaflets and posters were regularly updated and disseminated both in English and Bulgarian.

The AComIn project is visible in Bulgaria since 2 TV emissions of nation-wide TV channels as well as newspaper article have presented it. Further details about the various dissemination events and materials can be found in Deliverables D5.2 and D5.3.

**Deviations from schedule in WP5:** It is agreed with the European Commission that WP5 will run by 31 January 2016. Due to this reason an Workshop was shifted (to be held on 8 October 2015) and the main scientific event in the project – The International Conference AComIn-2015 as shifted to November 2015, which enables submission of high quality papers that present most recent project results.

## 1.6 WP7: Major Management Activities

Beyond the everyday management tasks that ensure smooth workflow, the Management team esp. the Executive Board performed the following major activities:

- Organisation of the Steering Committee Meeting after year 2 in October 2014;
- Delivery of D7.6: Strategy for Sustainable Development of the Institute of Information and Communication Technologies (month 24);

- Organisation of a Public Procurement Procedure (May 2014 – November 2014) for selecting of provider for the AComIn Speech Lab (Tender 3 for purchasing Smart Lab);
- Organisation of a Public Procurement procedure (April-June 2015, invitation for offers with 1 week duration) for selecting a publisher for the AComIn promotional materials;
- Organisation of a Public Procurement procedure (December 2014 – February 2015, invitation for offers with 1 week duration) for selecting a provider for 3D printer consumables for AComIn;
- Organisation of a Public Procurement procedure (June – September 2015, invitation for offers with 1 week duration) for selecting a provider for office consumables for AComIn.

The Deliverable D7.5 “Steering Committee Conclusions regarding AComIn Performance after Year 2” (m24) is available in the Team Area of AComIn site. Deliverable D7.6 “Steering Committee Conclusions regarding AComIn Performance after Year 3” (m36) is public and available at <http://iict.bas.bg/acomin/deliverables.html>. All the documentation related to the public procurement procedures in IICT is uploaded at the institute site at URL <http://www.iict.bas.bg/op.html> (in Bulgarian language).

## 2 MILESTONES FOR ACOMIN PERIOD 2

There is a milestone **M3** to be reached at the end of AComIn Reporting period 2:

**M3 WP1-WP5 successfully completed (month 36)** which fixes the following progress indicators:

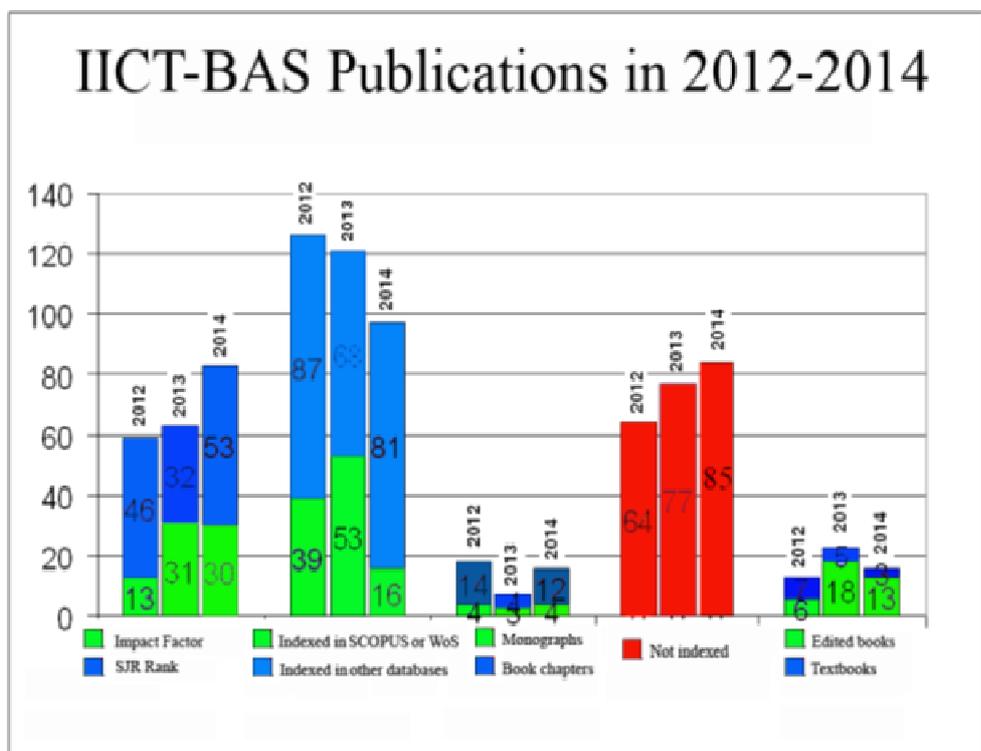
- *WP1: All positions for incoming experienced researchers are full; high quality research results are produced to strengthen the IICT research capacity as planned in the Performance Indicators; the planned person months for incoming researchers are fully utilised;*
- *WP2: Smart Lab running flawlessly; User Communities active and productive to ensure success according to the planned figures in the Performance Indicators;*
- *WP3: Networking according to plan;*
- *WP4: Submission of patent applications according to plan;*
- *WP5: Dissemination according to plan, sufficiently active to ensure the Social Impact as described in the Performance Indicators.*

## 3 ASSESSMENT OF ACOMIN PERFORMANCE IN PERIOD 2

The Workpackages WP1-WP5 will run until 31 January 2016 when final data concerning the project assessment will be available. At the moment we show some preliminary estimations of AComIn achievements according to the baseline figures of the selected performance indicators.

(i) **Research productivity:** *increase of the number and quality of scientific publications by 10%, based on the IICT Annual Report for 2011. The IICT Yearly Report for 2015 will be prepared after several months so we show here a figure with the increases of publication numbers in 2012-2014, see below. The papers published in journals with Impact Factor increase from 13 in 2012 to 31-30 in 2013-2014 respectively. This is an increase of about 130-133%. It is interesting to note that the papers with SJR indicator or indexed in other data bases decrease; the explanation is that they pass to the category of papers with Impact Factor. Further positive changes in this figure are expected after*

summarising the results for 2015 because there were 10 new post-doctoral researchers employed in AComIn year 3 and their research production will be reflected for the first time in the yearly statistics after 2015.



(ii) **Relevance to the socio-economic needs:** the number of contacts with industrial, governmental and NGO users and clients will be increased by 15% via contracts, established during AComIn. The number of joint development initiatives will be increased by at least 8-10 new initiatives starting within AComIn. As a baseline the number of IICT applied projects and contracts in 2011 will be used: 5 projects, funded by the Bulgarian SMEs Promotion Agency and 10 contracts for industrial research, funded by Bulgarian companies. The figures in this respect are:

According to the IICT Annual Report for 2013, IICT (as a partner of innovative Bulgarian SMEs) participates in 13 projects funded via the Operational Programme "Development of the Competitiveness of the Bulgarian Economy". This is 160 % increase, or at least 120%, if we count only the 6 running projects that are focused strictly on the AComIn topics (see D4.2 and D4.3).

IICT has in 2013 11 contracts for industrial research, funded directly by Bulgarian companies (10% increase compared to 2011). In 2014 IICT also has 11 contracts for industrial research funded directly by companies. In 2015 IICT has 15 contracts of this type. This is an increase of 36.3%. Please note that about one half of the industrial partners in these contracts are related in certain way to the User Communities.

(iii) **Human Resources:** the number of recruited foreign incoming researchers will be increased by 4 and the number of repatriated Bulgarian researchers by 3 (according to the positions planned for long-term employment).

For March 2014, the number of recruited incoming post-docs with long-term contract is 2 foreigners and 3 Bulgarians – so the indicator was satisfied when the performance was assessed in month 18.

For September 2015, the number of further recruited incoming post-docs with long-term contract is 9 foreigners and 7 Bulgarians – again, the indicator is satisfied.

*The number of defended PhD theses will be increased by at least 20% (in 2011 3 PhD theses were defended in IICT).*

The number of PhD theses defended in IICT after 2011 is as follows:

- in 2012 – 6 PhD theses;
- in 2013 – 7 PhD theses;
- in 2014 – 7 PhD theses;
- in 2015, before 30 September – 4 theses.

We expect that this number will grow in the near future (because some 30 young researchers and PhD students of IICT were included in the AComIn activities using a project for national co-financing of AComIn, funded by the Bulgarian Ministry of Education and Science after July 2014).

*(iv) **Innovation impact.** The number of patent applications, submitted within AComIn, will be at least 4. The software licenses will be at least 3. The User Communities will comprise hundreds of industrial experts. The achievements of AComIn in this respect are:*

- IICT was granted two certificates of industrial design in 2013;
- Two Bulgarian patent applications were extended to WIPO applications (see D4.3);
- One more application is prepared for WIPO and three more to the Bulgarian Patent Office (BPO). All of them will be submitted before 31 January 2016, see D4.3;
- Software developed within AComIn (**nano-archimedes**, a Technology Computer Aided Design tool - TCAD) is available as Open Source under gnu-license at <http://www.nano-archimedes.com/>;
- A language resource – core Bulgarian WordNet, developed with the support by AComIn secondments to the partnering organisation VU Amsterdam, is available as Open Resource at <http://compling.hss.ntu.edu.sg/omw/>
- An annotated multilingual corpus of Bulgarian speech, developed using AComIn Speech Lab, is available at <http://lml.bas.bg/BulPhonC>.
- As we said above, more than 400 experts participated in the technology Transfer Seminars in Reporting period 2.

These figures show that AComIn meets the expectations defined for “Innovation Impact” in the Performance Indicators.

*(v) **Social impact.** There will be hundreds of visitors at the Doors Open Days and attendees at the Information Days and Stakeholders meetings. There will be dozens of media reactions to the AComIn dissemination efforts.*

There are already hundreds of visitors only to the Technology Transfers seminars in Reporting Period 2 (more than 430). The deliverables D5.1 and D5.2 describe the Doors Open Days in 2015, participation in promotional events including meetings with kids, participation of AComIn in the Technical Fair Plovdiv and many others.

The most impressive participation of AComIn in an event implying wide social impact is the project poster and the 3D printed models in the Exhibition “The Battle of Pavia” held in Visconti Castle in Pavia, Italy, in June-November 2015 as an associated event of EXPO-2015 in Milan (see D5.2 and <http://iict.bas.bg/acomin/appreciation/Battle-of-Pavia.pdf> . Thousands of people visited the exhibition (probably dozens of thousands) so we consider that the requirement is successfully fulfilled.

## **4 CONCLUSION**

The conclusion is that the project is fully in line with the expected/planned figures that are the baseline defined in the Performance indicators in the Technical Annex. Further extension of WP1-WP5 duration by four months will help to improve the results so we shall report even higher achievements in January 2016.

Therefore we conclude that the “deviations from schedule” were insignificant for the project workflow and AComIn has achieved its objectives and technical goals with relatively minor deviations.