PROJECT FINAL REPORT

Grant Agreement number: 295039

Project acronym: RECOCAPE

Project title: REinforcing COopeartion CAPacity of Egypt in embedded ubiquitous computing

Funding Scheme: Competence Building (FP7-INCO-2011-6 Call)

Period covered: from Nov. 11, 2011 to Oct. 31, 2014

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4.1 Final publishable summary report

4.1.1 Executive Summary

Software Engineering Competence Center (SECC) has taken the mandate of increasing Egypt's competency in recent technologies as Service-Oriented Architecture, Enterprise Service Bus, Semantic Web, Model-Driven Development, and Embedded Ubiquitous Computing. To achieve this goal, the RECOCAPE project was initiated from SECC in cooperation with its European partners.

RECOCAPE is structured into 6 work packages as shown in Figure 1 :

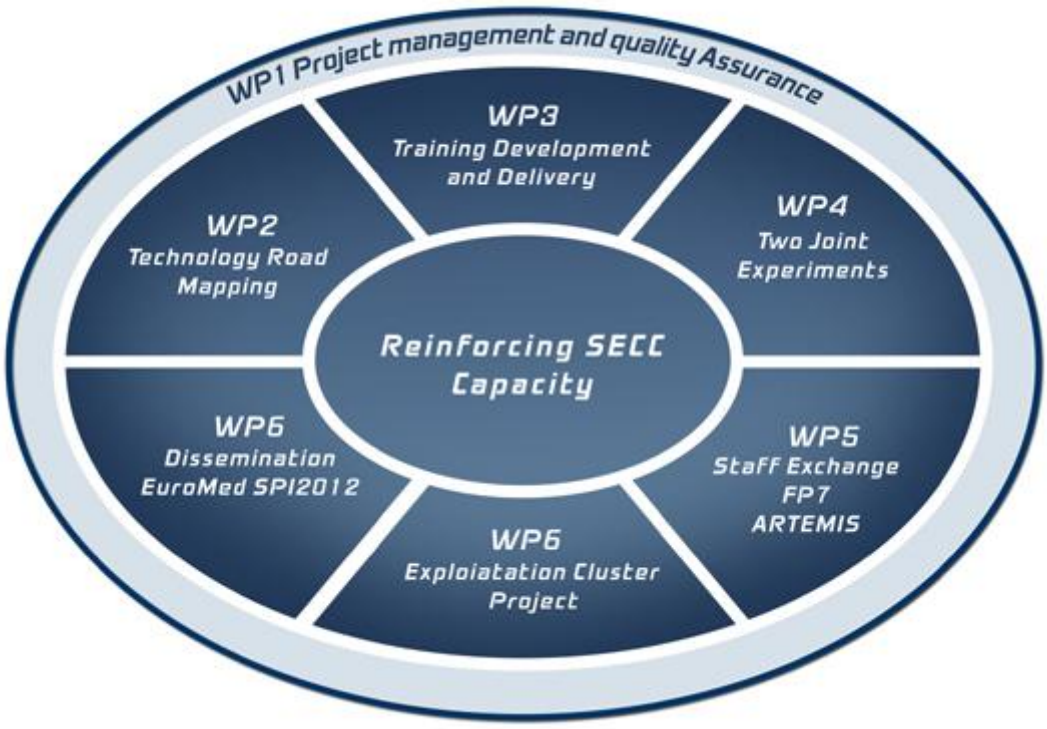

Figure 1 - RECOCAPE project work packages

In the following sections, the project context and objectives will be elaborated. Moreover, the work performed and the main results of the project will be discussed in more details.

4.1.2 Project Context

Software Engineering Competence Center (SECC) is one of the key players in the Egyptian ICT sector and mandated to increase Egypt's technological competencies. It aims at bridging the gap between technologies needed to overcome the economical, social, environmental challenges and the traditional technologies.

Consequently, SECC of Egypt, Tecnalia of Spain, VTT of Finland, and UNIBO of Italy forms an integrated consortium and proposed the Reinforcing COoperation Capacity of Egypt in embedded ubiquitous computing (RECOCAPE) project to leverage Egypt's competencies in these technologies. SECC is assigned to coordinate and execute the RECOCAPE project.

RECOCAPE is a project funded by the European Commission within the 7th Framework Programme (FP7).The project duration is 2 years, starting from November 1st 2011.

RECOCAPE focuses on recent technologies as Service Oriented Architecture, Semantic Web, Model-Driven Development, and Embedded Ubiquitous Computing.

Ubiquitous computing (ubicomp) is a post-desktop model of human-computer interaction in which information processing has been thoroughly integrated into everyday objects and activities.

Semantic Web is the next generation web where resources will be more accessible to automated processes. It's the vision of information that can be readily interpreted by machines, so machines can perform more of the tedious work involved in finding, combining, and acting upon information on the web not just for display purposes, but for automation, integration, and reuse of data across various applications.

SOA is an architecture methodology that views the system to be developed as set of services.

Model-driven Development, or MDD, is an approach that represents the software development life-cycle as a modelling and model transformation activities.

4.1.3 Project Objectives

The RECOCAPE Project aims at:

- ***Developing SECC's strategic technology plan*** to improve SECC's technology management, by applying R&D management best practices through internalizing the technology road mapping (TRM) methodology. The plan targets increasing SECC's capacity, visibility and scope in alignment with its mandate as well as increasing SECC's linkage with the economic and social environments by focusing on several technologies that add value to products and impact user sectors.
- ***Developing and delivering training modules*** to build competency in Service-Oriented Architecture, Semantic Web, Model-Driven Development, and Embedded Ubiquitous Computing.
- ***Setting up joint relevant pilot experiments*** with the project consortium partners in the aforementioned technologies to demonstrate the usage and synergy of the underlying target technologies in real-world situations.
- ***Exchanging SECC staff with TECNALIA*** to work on FP7 proposal preparation and related running projects to reinforce SECC's capacity in various European research programmes, FP7 proposal preparation and embedded ubiquitous computing.
- ***Disseminating knowledge*** through organizing key events and conferences to involve local stakeholders and generate regional impact.
- ***Exploiting results*** through implementing four cluster projects involving local ICT businesses as per their needs to receive early verification and validation of project results as well as to insure SECC's competency to consolidate knowledge and take corrective actions if needed. The cluster projects target transferring knowledge, building capacity and fulfilling the needs of the four ICT locals through training and R&D pilots.

4.1.4 Potential Impact

- Augment and enhance the capacity of SECC in emerging technologies to better serve the needs and evolve the capability of the local ICT market.
- Bridge the technology gap of the ICT industry in Egypt in four state-of-the-art technologies; namely, SOA/ESB, Semantic Web, MDD, and Embedded Ubiquitous Computing, by building their capacity, fulfilling their technology needs, and raising their competencies.

- Generate regional impact by involving both local and regional stakeholders in key events such as the AMECSE conference and others to disseminate the acquired knowledge and showcase the capability of Egypt in emerging technologies.

4.1.5 Main Science and Technology Results

As a part of Work Package 4 – **"WP4: Joint Experiments Setting Up"** two joint experiments were implemented by SECC and the European participants, TECNALIA, VTT, and UNIBO. The two experimental proof-of-concept projects aim at enforcing SECC capacity in the underlying technologies.

a. Joint Experiment 1- Energy Aware Smart Home

January and February 2013 witnessed the development of the first pilot project "Energy Aware Smart Home". The project aimed at deploying an extendible and configurable smart home system able to apply energy harvesting policies and providing instruments and mechanisms to edit and apply user preferences related to installed devices. The implementation used low cost Zigbee sensors attached to the devices that are to be controlled semantically based on user context and preferences. The project objectives were achieved by combining Smart-M3 interoperability platform and Service Oriented Architecture approach. The project was implemented by SECC engineers receiving consultation from UNIBO, Italy for Smart-M3 platform and from Tecnalia, Spain for Service Oriented Architecture.

The implemented system offers three modes of operations; administration mode, Maintenance Company's mode, and home user mode. In administration mode, the system admin creates and configures a smart home. This incorporates adding home info, locating devices in the smart home rooms, and adding contacts that will be used in case of emergency. A maintenance company can register for fixing certain types of faults. The main mode is the user mode where, a user can register and add preferences for device operation. User preferences will be applied when a user is identified using RFID. In case the user is not identified, default settings will be applied. A power saving mode is applied whenever no presence is detected. User can also monitor and control his smart space remotely via a web interface that displays all system info as well as faults or alarms together with candidate maintenance companies to fix.

The project was implemented to control light intensity, temperature via air condition, multimedia playback, and refrigerator temperature. This can be done either automatically based on user context (presence and identification) or manually by sending command via the web interface. Faults like AC and refrigerator compressor failures, refrigerator door open, and fire alarms are monitored and communicated to the user instantly through mobile application and is reflected in home monitoring web page.

Figure 2 - Controlling light (upper left), multimedia playback (upper right) via Zigbee node after receiving commands from Zigbee coordinator (lower left) based on user identification using RFID (lower right)

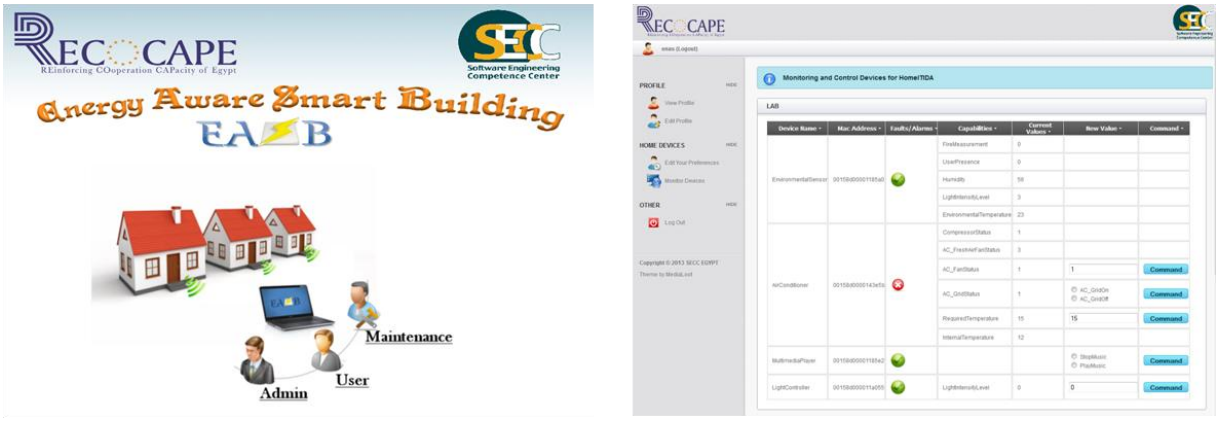

Figure 3 - Application offers 3 operation modes (left), user can monitor and control home devices remotely via web application (right)

b. Joint Experiment 2- Semantic Advertising Platform for Egypt (SALE)

April and May 2013 witnessed the development of the second pilot project "Semantic Advertising Platform for Egypt". The target of this pilot is to design and implement a semantic-based smart advertising platform. The aim of this platform is to provide a set of functionalities that will be used by those who develop applications for end-users and advertising companies. This platform allows for building different advertising campaigns to match the advertiser requirements and domain of work. Additionally, it can be extended in the future to allow multi-channel Ads such as web, or mobile devices.

The system deploys semantic technologies to link users and advertising entities anonymously. Using Service Oriented Architecture (SOA), large number of devices can use the system without the need for the device to support proprietary, large footprint middleware. Using SOA will also promote building wide spectrum of services on top of the semantic platform provided as the base system infrastructure.

Project main features:

1. Profile management for advertisers, publishers and end-users. This includes services such as registration, manage account (edit/delete), etc.
2. Automatic context update to automatically update user context via mobile upon which ads will be delivered.
3. Ads management to handle creating, editing, deleting ads. Ads info should be associated with the context to trigger Ad broadcast.
4. Content storage and lookup to manage storing and fetching content and metadata.
5. Security features such as:
    - Authentication to handle user login and protected data.
    - Authorization to provide the users with the ability to rate or even block Ads from certain sources as well as manage Ad broadcasting based on user authorization preferences.
6. Quality of Service to provide metrics collection (metrics such as success delivery rate among others) and analysis.

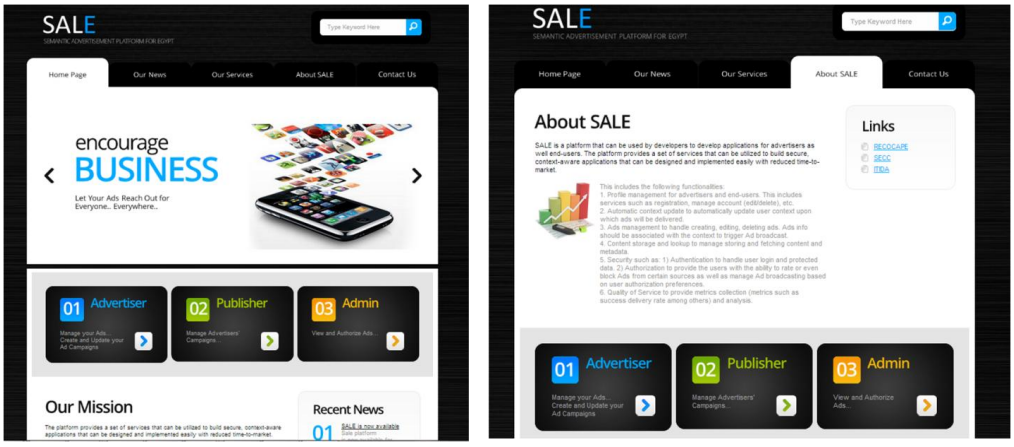

Figure 4 – Snapshot of the SALE applications developed as part of Joint Experiment 2 to reinforce the use of semantic technologies.

As a result of the joint experiments and cluster projects with Egyptian ICT companies, a number of research papers have been published in different venues.

a. Smart Home Paper in ICNS 2014

As an output of *Joint Experiment 1- Energy Aware Smart Home*, SECC R&D team, Egypt in cooperation with their research partners from University of Bologna, Italy and Cairo University, Egypt published a paper entitled **"Design and Implementation of an Interoperable and Extendable Smart Home Semantic Architecture using Smart-M3 and SOA".** The paper was published at *ICNS 2014 : The Tenth International Conference on Networking and Services* that was held on April 20 - 24, 2014 - Chamonix, France. Azza Kamal, Senior R&D engineer, SECC presented the paper and related work during the conference.

Figure 5 - Azza Kamal, Senior R&D Engineer presenting the paper during the conference in Chamonix, France

b. SALE Paper in AMECSE 2014

As an output of *Joint Experiment 2: Semantic Advertising Platform for Egypt* SECC R&D team, Egypt in cooperation with their research partners from Cairo University, Egypt published a paper entitled **"SALE – An Innovative Platform for Semantically Enriching Next Generation Advertising Services".** The paper was published at *AMECSE 2014 : The First Africa and Middle East Conference in Software Engineering* that was held on October 21 - 22, 2014 – Cairo, Egypt. Enas Ashraf, Senior R&D engineer, SECC presented the paper and related work during the conference.

Figure 6 - Enas Ashraf, Senior R&D Engineer presenting the paper during AMECSE 2014 conference

c. Smart-M3 – Sofia ADK Integration Paper in AMECSE 2014

As a result of the knowledge gained and the challenges faced during exploitation cluster projects. SECC R&D team, Egypt carried out an experiment to enhance the usage of Smart-M3 in rea life projects and published a paper entitled **"Improving Semantic-Based Application Development Experience by SOFIA ADK and RedSIB Integration".** The paper was published at AMECSE *2014 : The First Africa and Middle East Conference in Software Engineering* that was held on October 21 - 22, 2014 – Cairo, Egypt. Azza Kamal, Senior R&D engineer, SECC presented the paper and related work during the conference.

Figure 7 - Azza Kamal, Senior R&D Engineer presenting the paper during AMECSE 2014 conference

d. Technology Transfer Approach Paper in eChallenges e2014

As a result of the knowledge gained during the RECOCAPE project, SECC R&D team, Egypt published a paper entitled **"A Technology Transfer Approach for Stimulating Innovation of SMEs in Egypt".** The paper was published at *eChallenges e-2014* that was held on October 291 - 30, 2014 – Belfast, Northern Ireland. Haitham Hamza, R&D department manager, SECC presented the paper and related work during the conference.

4.1.6 Main Dissemination Activities and Exploitation Results

The following table summarizes the outcomes of the dissemination and exploitation activities that will be further illustrated throughout this section.

Table 1 - Summary of dissemination and exploitation activities

Activities	Details	Comments
Dissemination Activities		
RECOCAPE Website, posters, flyers	• Website: http://www.secc.org.eg/RECOCAPE/index.html • 1 poster • 1 flyer	Poster and flyer are available at RECOCAPE website: http://www.secc.org.eg/RECOCAPE/Publications.html
Networking Events	**Two main activities**: 1. Attending conferences 2. Holding sessions introducing RECOCAPE activities and technologies at universities	
Awareness Events	**SECC Organized 4 events** 1. RECOCAPE first event 2. RECOCAPE second event 3. Egypt SPIN event 4. RECOCAPE third event **SECC Organized 1 Conference** First Africa and Middle East Conference on Software Engineering	
Publications	**4 conference paper:** • "Design and Implementation of an Interoperable and Extendable Smart Home Semantic Architecture using Smart-M3 and SOA", *ICNS 2014* • "A Technology Transfer Approach for Stimulating Innovation of SMEs in Egypt", *e-challenges 2014*	

	• "Improving Semantic-Based Application Development Experience by SOFIA ADK and RedSIB Integration", *AMECSE 2014* • "SALE – An Innovative Platform for Semantically Enriching Next Generation Advertising Services", *AMECSE 2014*	
Knowledge Assets	**<u>20 Knowledge dissemination documents</u>** • 8 tutorials • 3 technical reports • 5 technical digests • 4 case studies	Published on RECOCAPE Website: http://www.secc.org.eg/RECOCAPE/Publications.html
Webinars	**<u>1 webinar:</u>** SECC semantic hackathon webinar	Available on SECC YouTube channel https://www.youtube.com/watch?v=e7If7zCmytA
Exploitation Activities		
Training Services	**<u>4 new training courses</u>** (3 days each) 1. Introduction to SOA for SMEs 2. Introduction to Semantic-Web Information Management 3. Domain Specific Modeling for Automatic Code Generation 4. Introduction to Application Development for Smart Environments **<u>2 new SPOT(s)</u>** 1. Semantic Technology using Smart-M3 SPOT 2. Technology Roadmap - TRM Development SPOT	• SPOT: SECC Practice on Technology is a one day hands-on workshop • SECC training catalogue is updated with the new courses
Consultation Services	**<u>5 new consultation services</u>** 1. Semantic Web Service 2. Service Oriented Architecture Service 3. Model Driven Development Service 4. Smart Environment Service 5. Technology Roadmap – TRM Service	• Services delivered to 7 customers • SECC service catalogue is updated with the new services
Community Forums	**<u>2 Community venues</u>** 1. Internet of Things – IoT Egypt Forum	

	2. SALE Community	
Competitions	**<u>1 competition</u>**: SECC Hackathon on semantic web technologies using SALE platform	

4.1.6.1 Media and Printouts

i. RECOCAPE Website

RECOCAPE website; http://www.secc.org.eg/RECOCAPE/index.html was launched in December 2011. The website provides detailed description and timely updates about the RECOCAPE project (objectives, partners, and work packages). Events, media, and news about RECOCAPE project activities are regularly posted and updated on the website. In order to increase visibility and exposure, all RECOCAPE news and links are posted and regularly updated on the main website of the Software Engineering Competence Center (SECC) at http://www.secc.org.eg/.

Figure 8 – Snapshot of the RECOCAPE website - October 2014

ii. News Articles

News articles about the RECOCAPE project were published in more than 20 local reputable newspapers and magazines. The news articles introduced the RECOCAPE project objectives, partners, and target technologies. All published news articles are available on RECOCAPE website http://www.secc.org.eg/RECOCAPE/Media.html

4.1.6.2 Networking Events

i. Third Regional ERA-WIDE Meeting

Haitham Hamza, SECC R&D Department Manager, participated in the 4-day third regional ERA-WIDE meeting held in Brussels from 9th to 12th July, 2012 at the premises of the European Commission.

The ERA-WIDE aims at building/extending the collaboration between EU research institutions and research institutions based in European Neighbourhood Policy (ENP) countries.

ii. EU Opportunities for Young Researchers Talk

In the context of the EU-Egypt Year of Science & Innovation 2012, in coordination with the Ministry of Scientific Research and in the presence of Dr. Nadia Zakhary, Minister of Scientific Research, the Head of Delegation of the European Union to Egypt, Ambassador James Moran, Haitham Hamza from SECC, gave brief presentations of RECOCAPE project objectives and underlying technologies. The Ceremony was held at the Ambassador's residence on 25 November 2012.

iii. MIRA Poster Session

On January, 2013, MIRA, the Mediterranean Innovation and Research Coordination Action (FP7 - INCO-NET Project), prepared a Poster Session of Projects in support of international research and innovation cooperation under the framework of its Final Conference. SECC was invited to submit an abstract and a poster of RECOCAPE project, to be part of this poster session that was held on 24th and 25th January in Marrakesh, Morocco. The participating poster introduced RECOCAPE project, its objectives, achievements, and expected impact.

iv. Closing Event of the EU-Egypt Year of Science and Innovation 2012

The European Union and Egypt celebrated 2012 the "EU-Egypt Year of Science and Innovation". The "Years of Science" is an initiative that started by the Egyptian Ministry of Scientific Research in 2007 within the context of a greater plan for reforms to strengthen Egypt's science and technology.

During the event on April 18th Enas Ashraf, Senior R&D Engineer at SECC, participated in the poster session presenting RECOCAPE project objectives and achievements. The poster session offered a platform for discussions with scientists in different domains for future collaboration.

19 April, Azza Kamal, Senior R&D Engineer at SECC has attended the “Famelab National Competition”. The competition was introduced to Egypt in 2009 in support of the government’s efforts to advance science and to build a culture that understands and supports the positive role science plays in the economic and social well-being.

On April 20th, Ahmed Gamaleldin, Senior R&D Engineer at SECC has participated in “ShERACA Networking and Coordination meeting” at the Ministry of Scientific Research. During this meeting, Ahmed demonstrated a presentation about RECOCAPE project status including what has been achieved and what is next. Moreover, Ahmed Gamaleldin has participated in “ShERACA Training Seminar” sponsored by the Ministry of Scientific Research RDI program on April 21st and April 22nd .

Figure 9 - Ahmed Gamal with Mr.Tomas Matraia-EU policy officer with the workshop team

v. Networking with Universities

As a part of dissemination activities, the R&D department – SECC organized a series of meetings with universities in Egypt with the purpose of introducing RECOCAPE activities and technologies to the community. This includes the French University in Egypt, Cranfield University and the German University in Cairo.

Figure 10 - Prof. Essam Shehab (Crafield University, UK) during the meeting with the R&D and business developments teams (SECC, Egypt)

vi. IEEE EMB Conference

On 9 October 2013, Azza Kamal, Senior R&D Engineer at SECC presented a talk about "**Empowering Environments by Semantic Technology – Towards Smarter Hospital Systems**" in the First IEEE EMBS (Engineering in Medicine & Biology Society) International Students Conference.

The conference was held under the umbrella of IEEE and EMBS in Cairo University. The talk highlighted the role of the semantic technology in building smart environments with focus on its role in medical and healthcare domain.

Figure 11 - Azza Kamal presenting during the conference

vii. Africa-EU Cooperation Forum on ICT

December 2013 witnessed the participation of Haitham Hamza, SECC R&D department manager in the "2013 Africa-EU Cooperation Forum on ICT". The two days event was held on December 2-3, 2013 in Addis Ababa, Ethiopia. Dr. Haitham Hamza presented a talk entitled "**Local Innovation and Technology Transfer in Egypt**". The talk introduced RECOCAPE project as a success story in local innovation and technology transfer. The talk also briefed the efforts exerted by the Information Technology Academia Collaboration (ITAC) department and Technology Innovation and Entrepreneurship Center (TIEC) in promoting innovation and encouraging R&D collaboration in Egypt.

Figure 12 - Haitham Hamza, SECC R&D department manager during his talk about local innovation and technology transfer in Egypt

viii. IST-Africa Horizon 2020 Workshop

Haitham Hamza, R&D Department Manager, Ahmed Gamledin and Azza Kamal, Senior R&D Engineers, SECC participated in the IST-Africa Horizon 2020 Workshop on February 10th, 2014 held at Smart Village, Egypt. The workshop was organized by the Ministry of Communications and Information Technology, Egypt in cooperation with IIMC Ireland (IST-Africa Project Coordinator) as part of IST-Africa Initiative supported by the European Commission under FP7. Dr. Hamza presented SECC experiences in coordinating RECOCAPE FP7 project and the plans for H2020.

ix. Third Annual ICT for PWD Conference

April 13, 14 witnessed the inauguration of the *third annual ICT for People with Disabilities (PWDs) Conference: Integration, Empowerment, and Participation*. The conference is organized by the Ministry of Communications and Information Technology. The conference aims at empowering and integrating PWDs into the community to benefit of their capabilities and innovations. During the conference, Haitham Hamza, R&D department manager, SECC conducted a session providing and overview of Horizon2020 and the opportunities available for the ICT community in Egypt.

x. IST-Africa Project Meeting

IST-Africa is a strategic collaboration between IIMC (Ireland) and Ministries and National Councils responsible for Information Society, ICT and/or STI (Science, Technology & Innovation) adoption, policy and research in 18 African Countries. IST-Africa is supported by the European Commission and African Union Commission and co-funded under the EU Framework Programme with the aim to support the information society in Africa through international innovation and research policies, collaborative projects, knowledge sharing as well as Africa-EU strategic partnerships.

As a part of SECC R&D role in IST-Africa, Haitham Hamza, R&D Department Manager, SECC attended IST-Africa project meeting on May 4th. On May 5th, Dr. Hamza attended the living labs workshop.

xi. IST-Africa 2014 Conference

Haitham Hamza, R&D Department Manager, SECC participated in the IST-Africa 2014 Conference & Exhibition that was held in Mauritius on May 6th -9th 2014. During the conference, on May 8th, Dr. Hamza presented a talk entitled "ICT Initiatives and Research Capacity of Egypt" during which he summarized Egypt's participation in FP7 projects and research mapping. Dr. Hamza also chaired a session about "Societal Implication of Technology".

On May 9th, Dr. Hamza attended NCP (National Contact Point) training during which the roles of NCP and the principles of NCP effectiveness were discussed.

Figure 13 - Dr. Haitham Hamza, SECC presenting a talk about ICT Initiatives and Research Capacity of Egypt

xii. eChallenges e-2014 Conference

Haitham Hamza, R&D Department Manager, SECC participated in the eChallenges e-2014 Conference that was hels in Belfast, Northern lreland on October 29-30, 2014. As a result of the knowledge gained during the RECOCAPE, SECC R&D team, Egypt published a paper entitled **"A Technology Transfer Approach for Stimulating Innovation of SMEs in Egypt".**

4.1.6.3 Awareness Events

i. Awareness Event 1 – May 15th, 2012

Software Engineering Competence Center (SECC) held its first event RECOCAPE on May 15th, 2012 at the smart village in cooperation with its allies from Spain and Italy. The event aimed at shedding light on the challenges faced by Egyptian ICT companies and the opportunities in adopting emerging software technologies including Service-Oriented Architecture (SOA), Semantic Web, Model-Driven Development (MDD), Software Reuse and Software Refactoring.

The event was attended by 50 IT professionals from 45 companies. During the event, SECC experts and foreign guests from TECNALIA of Spain and UNIBO of Italy presented on five technologies including emerging applications for Service-Oriented Architecture (SOA); Semantic Web technologies; applicability of Model Driven Development to software factories; discovering features interactions in software product lines and an Agile approach to software process improvement.

Event presentations can be downloaded from the RECOCAPE website at: http://www.secc.org.eg/RECOCAPE/Events.html.

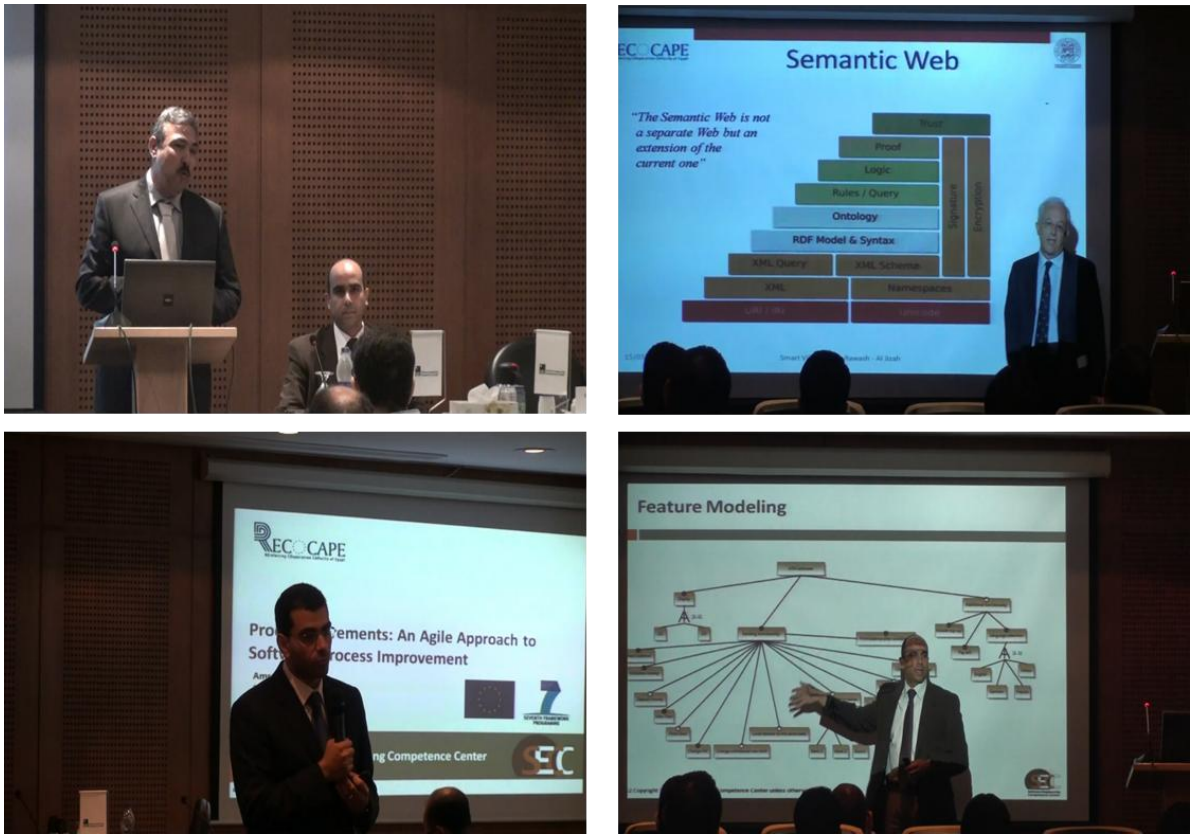

Figure 14 – Awareness Event 1 Presentations

ii. Awareness Event 2 – November 14th, 2012

Software Engineering Competence Center (SECC) held its second event of RECOCAPE in "Emerging Software Technologies: Trends & Challenges" on November 14th, 2012 at the smart village in cooperation with its allies from Spain and Italy. The event aimed at exploring challenges and opportunities in adopting emerging software technologies. The event was held at ITIDA Premises B121, Smart Village.

The event was attended by 57 IT professionals from 47 companies. During the event, SECC experts and foreign guests from TECNALIA of Spain and UNIBO of Italy presented on five technologies including Semantic Web & Embedded Systems; Security Aspects in Smart Environments; Agile Process Improvement in Practice; SOA & Cloud in Practice, as well as presenting about FP7 Funding Opportunities in ICT Industry.

Event presentations can be downloaded from the RECOCAPE website at: http://www.secc.org.eg/RECOCAPE/Events.html#2nd

Figure 15 – Awareness Event 1 Presentations

iii. Egypt SPIN Event – October 2nd, 2013

Egypt-SPIN is a group of Egyptian software professionals interested in Software Process Improvement (SPI) to provide a leadership forum for exchange of SPI experiences which will assist the Egyptian Software Organization to embark upon SPI. Egypt SPIN Events are among the most important SECC activities to promote software process maturity in Egypt; and share lessons learned with participants within the country and with other SPINs all over the world.

As a part of work package 6 'Dissemination and Exploitation' in RECOCAPE project, SECC organized Egypt SPIN event on "Smart Spaces: Challenges and Opportunities" on October 2nd, 2013. The event was held in the Smart Village Convention Centre where 48 attendees from 39 organizations showed great interest in the topics addressed.

A group of SECC experts together with industry and academia professionals presented on a variety of topics on Smart Spaces. The event aimed at exploring the current state-of-the-art and state-of-the-practice in research and development of smart spaces in Egypt. Speakers shared their on-going efforts, current results, and future visions for adopting smart environments in Egypt. A broader vision about the business opportunities that can be

exploited from developing smart spaces in the form of products and innovative services in developing countries were also discussed.

Event presentations can be downloaded from the RECOCAPE website at: http://www.secc.org.eg/RECOCAPE/Events.html.

Figure 16 – SPIN Event Presentations

iv. Awareness Event 3 – February 26th, 2014

The third RECOCAPE event aimed at exploring "Semantic Technologies for Web, Applications and Internet of Things (IoT)". The event discussed Semantic Technology utilization in dealing with the increasing complexity of emerging systems and its role in the realization of the IoT technology. Sessions were provided by a group of SECC experts, Industry professionals and representatives from Tecnalia of Spain, VTT of Finland and

UNIBO of Italy. The event was attended by 49 IT professionals from 28 companies and 5 universities.

In conjunction, the event witnessed the launching of the **IoT-Egypt Forum** and the kick-off of the first **SECC Hackathon on Semantic Technology using the SALE (Semantic Advertisement pLatform for Egypt) platform** developed during the RECOCAPE project.

Event presentations can be downloaded from the RECOCAPE website at: http://www.secc.org.eg/RECOCAPE/Events.html.

Figure 17 – Awareness Event 3 Presentations

v. AMECSE 2014 – October 21-22, 2014

Africa and Middle East Conference in Software Engineering - AMECSE2014, is the first conference in Africa and Middle East Regions specialized in software engineering. The first edition of AMECSE focuses on innovative software with real impact on the society and economy with the theme ***Software Innovation for Sustainable Economy***. It aims at

- Starting the first forum in the region for researchers and practitioners to present, and share the most recent innovations, trends, experiences and concerns in the field of software engineering.
- Exploring the required innovation ecosystem that should be develop and maintained to stimulate entrepreneurship
- Discussing the latest innovations in software engineering practices and technologies and how they can create sustainable results and significant momentum for research in Africa and the Middle East.
- Providing all stakeholders with a key opportunity to network and to further strengthen the development of cooperation on both policy making and research in order to solve joint challenges within the region.

The conference was supported technically by number of ICT key players in Egypt;. Microsoft Research, Orange labs and ITS Egypt.

Figure 18 - AMECSE 2014 Organizers and Sponsors

The conference was attended by 330 of ICT stakeholders, industry professionals and academia from 52 companies and 27 universities. The two-day conference provided an exciting program of 9 world-class keynote speakers from leading organizations and startups from Egypt, Kenya, Rwanda and UK. The program also contained 8 tutorials in cutting-edge topics in software engineering including Agile, SOA and embedded systems. 16 high-quality industrial and research papers were divided into two tracks; namely **Quality & Software Process Improvement** track and **Software Innovation & Smart Spaces** track. The conference also provided a chance for number of posters and product demonstrations to be displayed and discussed.

Alongside with the conference a hackathon was held for developing genuine mobile application ideas.

Figure 19 - AMECSE 2014 Keynote Speakers

The end of the second day of the conference witnessed three main activities; conference closure during which Hossam Osman, SECC Chairman thanked all attendees and announced the best paper award that was granted to the paper "Objective Visionary of CMMI Implementation" by Wael Philops, ITS Egypt.

Figure 20 - Hossam Osman, Conference Chair and SECC Chairman announcing best paper award

Following this Hossam Osman announced the winners in the Hack4mobile hackathon that was held alongside with the conference.

Figure 21 - Hack4Mobile first place award winners

Finally, Haitham Hamza, R&D Department manager, SECC, Egypt announced the closure of RECOCAPE project displaying a video on RECOCAPE project impact on the ICT community in Egypt.

Figure 22 - Haitham Hamza, R&D department manager, SECC, Egypt announcing the closure of REOCAPE project

All details about the conference program, speakers, tutorials and papers are available on the conference website http://2014.amecse-conferences.org/ .

4.1.6.4 Knowledge Assets

As a part of RECOCAPE project activities and for the purpose of transferring acquired knowledge to the community, SECC R&D Team takes the responsibility of regularly developing tutorials and other publications in the four state of the art topics; SOA, Semantic Web, MDD, and Ubiquitous Computing. Listed here are the titles of the tutorials, technical reports, technical digests, and case studies developed during the project so far (available at http://www.secc.org.eg/RECOCAPE/Publications.html)

1. Tutorial: A Quick Introduction to SOA

2. Tutorial: Development and Deployment of JAX-WS Web Services using ApacheCXF and Mule ESB
3. Tutorial: How To Develop Smart Android Notifications using Google Cloud Messaging Service
4. Tutorial: Getting Started with Model Driven Development and Domain Specific Modeling
5. Tutorial: A Quick Guide to Cloud Computing Concepts with Practical Steps for Using Amazon EC2 IaaS Technology
6. Tutorial: How to Develop Smart Android Notifications using Google Cloud Messaging Service
7. Tutorial: Development and Deployment of JAX-WS Web Services using Apache CXF and Mule ESB
8. Tutorial: Development and Deployment of REST Web Services in JAVA
9. Technical Report: ZigBee Based Hardware Infrastructure for Wireless Connectivity in User Environments
10. Technical Report: Securing Un-Secured SIBs
11. Technical Report: Semantic Technologies Applied to Content Management System
12. Technical Digests: a technical digest is a one page overview of RECOCAPE different technologies. Five technical digests were developed to explain semantic web, SOA, MDD, cloud computing, and smart spaces.
13. Case Studies: Four case studies were developed to summarize the challenges and experience gained upon the delivery of RECOCAPE services to the ICT community in Egypt.

4.1.6.5 Training Services

The project team in Egypt was able to tailor the knowledge gained from the training received in WP2, the practical hands-on obtained from the implementation of the pilot projects in WP4, and the experience gained during the Staff Exchange programs in WP5 to develop and deliver courses that best match the local market in terms of their needs and capabilities. Four new training tracks were developed and added to SECC training catalogue. The four tracks focused on the project's 4 main technologies, SOA, MDD, semantic web, and ubiquitous computing starting with basic courses entitled "**Introduction to SOA for SMEs**", "**Introduction to Semantic-Web Information Management**", "**Domain Specific Modeling for Automatic Code Generation**", and "**Introduction to Application Development for Smart Environments**".

12	Introduction to Semantic-Web Information Management	Round(1)Round(2)Round(2) 14 Apr 19 May 23 Jun	3 Days	Details	Registration
13	Introduction to Application Development for Smart Environments	Round(1)Round(2) 4 Mar 23 Jun	3 Days	Details	Registration
14	Introduction to Service Oriented Architecture (SOA)	Round(1)Round(2) 10 Mar 16 Jun	3 Days	Details	Registration
15	Domain Specific Modeling for Automatic Code Generation	Round(1)Round(2) 10 Feb 2 Jun	3 Days	Details	Registration

Figure 23 - The 4 developed courses as part of SECC semi-annual training plan
http://www.secc.org.eg/Training_Offer_2014.asp

Along with the conventional multiday training course, a new training model was introduced to the market called **Learn on the SPOT – SECC Practice On Technology**. Learn on-the SPOT is a one day workshop introducing the target technology, tools and techniques supporting the technology, and potential business impact upon adopting the target technology. It is a blended model of training with more focus on exercising and hands-on-experience solving certain problem and/or reaching a specific target.

Table 2 - Summary of new training services

Course	Description
Introduction to SOA for SMEs	This 3 days course introduces SOA concepts and approaches for SMEs. It addresses how to build SOA environments using open source tools and how to capitalize on other providers' services. During the 3 days, the attendees have hands on experience with Mule ESB through various examples and exercises. The course was held twice on May, 2013 and March, 2014 and was conducted by Ahmed Gamal, Senior R&D Engineer at SECC, Mohamed Maher and Hashim Sharif, two SOA experts.
Introduction to Semantic-Web Information Management	This 3 days course introduces semantic web concepts applied to content management systems. The difference between traditional and semantic content management systems is addressed during the course through hands on experience with semantic and content management systems technologies and tools. The course was held 3 times during May 2013, January 2014, and April 2014 and was conducted by Enas Ashraf, Senior R&D Engineer at SECC and Hadeal Ismail, semantic web researcher, ANSR lab, Cairo University.
Domain Specific Modeling for Automatic Code Generation	This 3 days course introduces basic concepts of MDD and the key benefits of using Domain Specific Modeling as well as model to text transformation for automatic code generation. Moreover, the course provides hands-on experience on the underlying technologies to adopt MDD. The course was held 3 times during June 2013, December 2013 and February, 2014 of which one round was based on a special request from one of the biggest companies in embedded systems for automotive industry in Egypt. The course was conducted by Enas Ashraf, Senior R&D Engineer at SECC.
Introduction to Application Development for Smart Environments	This course introduces the basic concepts of smart environments and provided practical hands-on experience in using SMART-M3 architecture to develop smart environment applications. The course was held twice on June 2013, September 2013. The course was conducted by Azza Kamal and Mahmoud Mohamed, Senior R&D Engineers at SECC.
Semantic Technology using Smart-M3 SPOT	This SPOT focuses on exploiting the Semantic Web technology into business. Semantic technology is a new way of representing data in a machine understandable format. This can be applied to any business domain as an alternative to traditional data models like relational databases. The SPOT was conducted once on April 2014.
Technology	The TRM SPOT is a one day hands-on session delivered to introduce

Roadmap - TRM Development SPOT	TRM, its process, and the potential business impact upon its adoption. The SPOT also gives the attendees the chance to practice the TRM process on a typical case study to finally generate a roadmap.

Figure 24 - Mohamed Maher, SOA Expert while conducting SOA course

Figure 25 - Hadeal Ismail during Semantic Web course

Figure 26 – Enas Ashraf discussing DSM with attendees

Figure 27 – Mahmoud Mohamed and Azza Kamal during Smart Environment course

4.1.6.6 Consultation Services

As an outcome of the projects tasks, activities, and gained experience, a new set of services were charted and piloted to a number of Egyptian ICT companies. Five new consultation services were offered to the community and were added to SECC service catalogue.
The 5 new services were delivered to 7 Egyptian companies during and after project exploitation phase.

Figure 28 – The 5 services were exploited with 7 different Egyptian companies

Table 3 - Table 2 - Summary of new consultation services

Service	Description
Semantic Web Service	Semantic web consultancy provides hands-on-support on how to implement and integrate semantic technologies to websites.
Service Oriented Architecture Service	SOA Consultancy provides consultation services for the SMEs to adopt SOA technologies in their work and to leverage open-source SOA solutions along with emerging technologies (e.g. Cloud, Mobile).
Smart Environment Service	Smart Environments Consultancy provides consultation services for the SMEs to adopt SMART-M3 architecture to develop smart environments applications.
Model Driven Development Service	Model Driven Development consultancy provides coaching for the adoption of MDD techniques in organizations and building the organization's own Domain Specific Language(s) for modeling and model transformation.
Technology Roadmap – TRM Service	The TRM consultancy helps companies to develop their short- to medium-range TRM plan. The Consultation service is divided into a set of workshops, each of which determines a main component of the technology roadmap. A consolidation and final charting is then done and the TRM is developed

4.1.6.7 Community Forums

With the purpose to involve the ICT community in Egypt in the RECOAPE technologies and with the aim to grow an integrated community that is able adopt and excel in the target technologies, two community engagement venues were initiated; Internet of Things - IoT Egypt Forum and Semantic Advertising Platform for Egypt - SALE Community.

i. IoT Egypt Forum

The IoT Egypt Forum seeks to establish a foundation for IoT technologies and applications in Egypt aiming at solving societal and economical challenges (http://www.iot-egypt.com/). The IoT Egypt forum aims at the development, dissemination and deployment of the Internet of Things technology in Egypt.

SECC along with other Egyptian entities and individuals representing industry and academia are organized into workgroups to study the technology from technical, governmental, societal, and business perspectives. The IoT Egypt Forum is formed of a number of work groups each of which has a set of goals, and is responsible for achieving these goals. Three main work groups currently form the IoT Egypt Forum:

1. **Societal and Economic:** The Societal and Economic working group is responsible for studying the challenges and trends of applying Internet of Things technology in Egypt along with the economic and business aspects related to the development and implementation of this technology.
2. **Infrastructure and Legislation**: The Infrastructure and Legislation working group is responsible for evaluating IoT architectures and technology solutions. In addition, it is responsible for discussing and analysis of the legislative aspects of IoT. This working group considers the new technologies emerging from the research community and triggers the research community to focus on the research areas that can benefit IoT deployment in Egypt.
3. **Governance**: The Governance working group is responsible for assisting the policy makers in setting the rules and processes that affects decision making regarding openness, security, accountability, and compliance in order to control the evolution and use of IoT technology in Egypt.

The IoT Egypt Forum welcomes participation from individuals as well as all organizations, both for-profit and non-profit, with relevant technical interests.

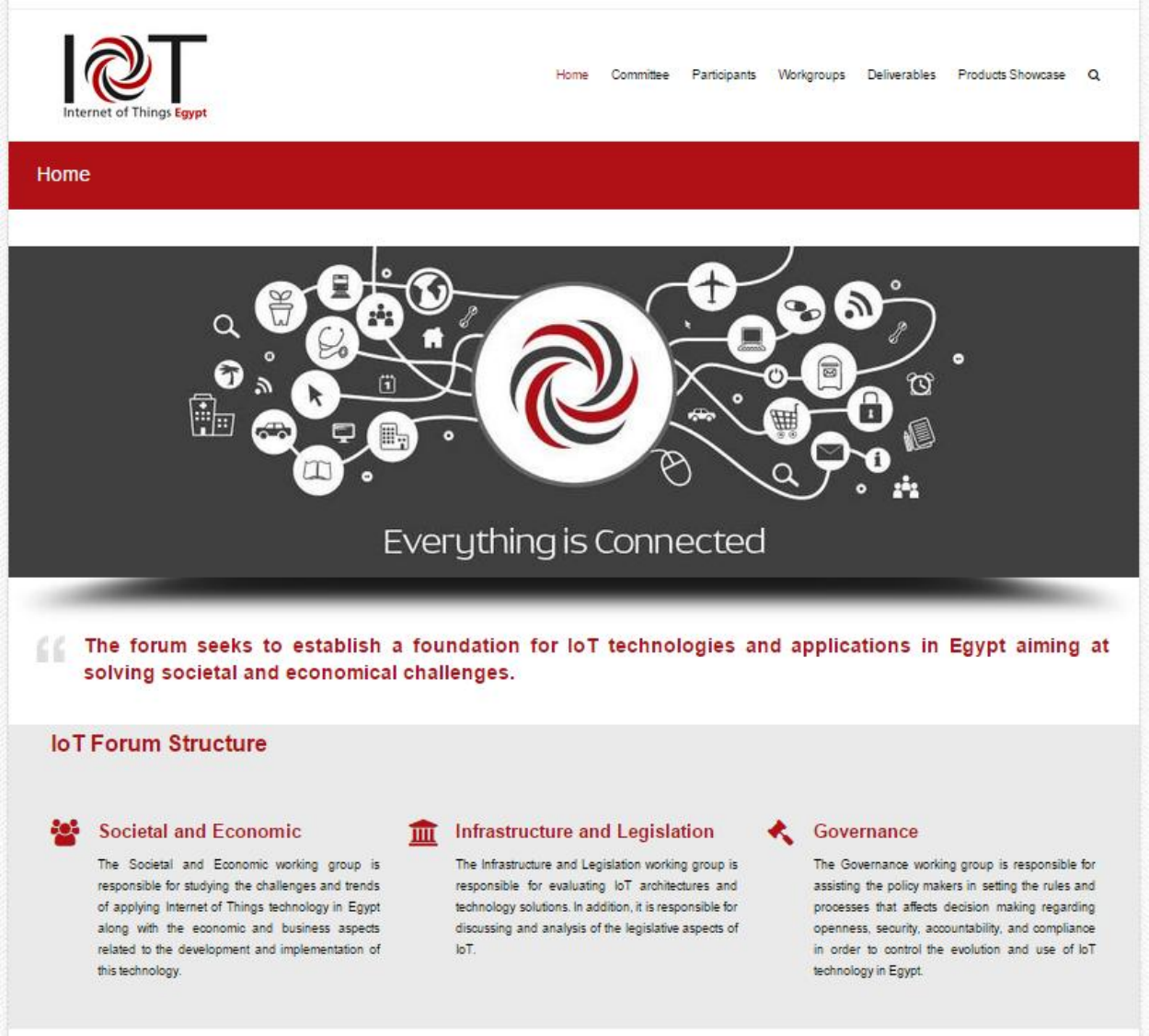

Figure 29 - Snapshots of IoT Egypt Forum website – October 2014

ii. SALE Community

The Semantic Advertising Platform for Egypt – SALE community aims at promoting SALE to the ICT community as an open source advertising platform. SALE was the main deliverable of *Joint Experiment 2- Semantic Advertising Platform for Egypt (SALE)* whose first release was delivered on May 2013. Further releases were developed adding new features to the platform to help promote the used technologies in the open source community (www.sale-community.com/).

As a first step of introducing the new platform, SECC announced the first hackathon on semantic web technologies using SALE. The hackathom aims at:

- Promoting semantic technologies to the Egyptian ICT market
- Grow SALE features through a software competition for developing applications and new features to SALE platform.

July 3, 2014 witnessed the closure ceremony of the First Semantic-Web Hachathon that was announced by SECC on February 26, 2014. The "Real Estate Smart Link" team successfully passed all stages of the Hackathon: Use Case Ideas and Use Case Implementation stages and won the Hackathon.

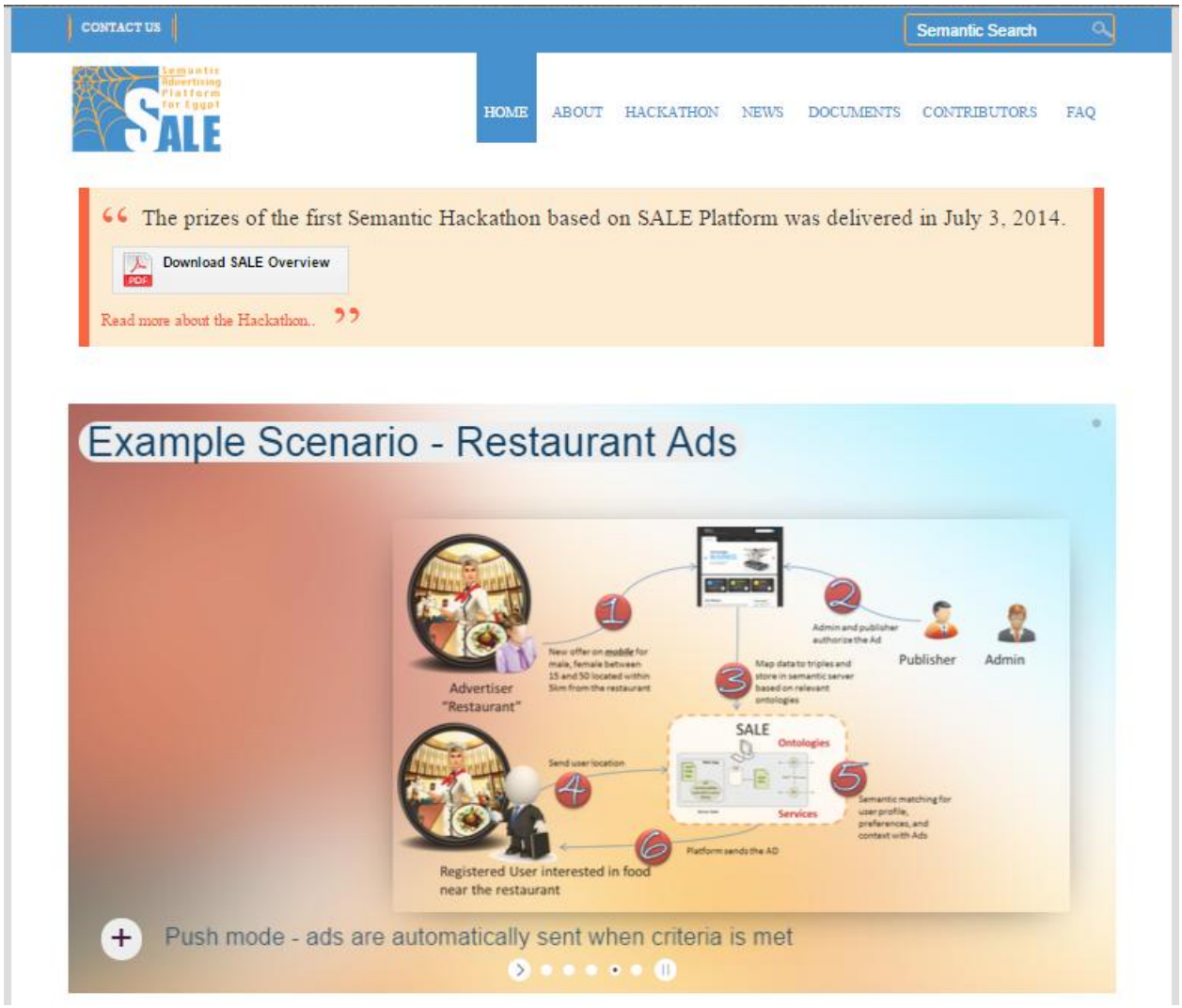

Figure 30 - Snapshots of SALE Community website – October 2014