Research & Innovation 2017
Innovation is in our DNA

Come with us to the future of technologies
Welcome to this new annual issue of our booklet, which presents Atos Research & Innovation (ARI) activities during 2017.

Our mission is to investigate emerging technologies and anticipate market demand with innovative solutions. However, logically, one of the main challenges faced by our group is to reduce the gap between research, innovation and the market. Due to the progress made in approaching different teams within Atos, as well as directly with potential customers, ARI is able to transform acquired knowledge and developed solutions into real business opportunities.

The ‘Strategic Projects’ section is the place to go for an overview of projects that have strong chances to become part of the offering to the market due to their business value and expected impact on society.

ARI expertise and innovation focus is being recognized as a valuable source of business. A good example is the delivery of Innovation and Ideas Generation workshops based on a methodology developed within a R&D project. Having brought successful results to the company, ARI runs those workshops regularly in Atos and they are offered as an added value service to Atos customers.

Thanks to ARI, Atos is a full member of the Big Data Value Association (BDVA), the Alliance for Internet of Things Innovation (AIOTI) and the 5G Infrastructure Association. Atos Spain is a core partner of EIT Health and EIT Digital. Atos is also a platinum member of the FIWARE Foundation with the support of ARI and due to our active participation in the whole FIWARE initiative. ARI experts sit on the governing boards of all those associations.

In 2017, Atos Spain became member of the European Factories of the Future Association (EFFRA). This Public Private Partnership (PPP) coordinates the Factories of the Future (F2F) topics in H2020. Our expectation with this membership is to position Atos Spain as a reference in the R&D Manufacturing Domain. Additionally, Atos has been particularly active in two working groups (Digital Platforms and Digital Innovation Hubs) instruments to the Strategy for Digitizing European Industry (DEI).

Finally, the number and diversity of projects described in this report show the intensive activity of our group. The latest EU H2020 statistics continue to rank Atos Spain in the R&D Digital Services company at European level with most participation in projects. This excellent position in the EU Research and Innovation arena increases the visibility, not only of ARI and Atos Spain, but also of Atos as a global company.

Don’t hesitate to send us your feedback at es-atosresearch@atos.net, we are happy to take it into consideration!
The vision of the Research & Innovation group of Atos is mainly focused on applying the latest research outcomes to real world situations where Atos clients need solutions that go beyond what current products provide.

You will find in our group a source of innovative ideas and expertise in emerging technologies. In this sense, we are the R&D hub for the whole Atos Group. Thanks to our large expertise in research, development and innovation projects, we are able to bring new solutions and innovative elements to customers’ business.

Our focus on the combination of advanced technological developments and commercial exploitation of project outcomes leads to innovative but realistic solutions. Our capacity of coordinating international partnerships and our extended network of technology centers, universities and user organizations makes us a reliable business partner.

Since 1987, we have been deeply involved in research, development and innovation (RDI) projects. We have become an extremely well-known player in the European research arena, with references in various Directorates-General of the European Commission.

Furthermore, Atos, as an ICT global player, is active in long-term EU working groups and therefore has a say in the definition of future funding programs. For almost 30 years, we have acquired valuable expertise in innovation management. Based on the day-to-day activity in research and innovation projects, our group has developed efficient working processes, templates, knowledge base, and collaborative tools. From strategy to project management, from the generation of ideas to the identification of funding opportunities and selection of the right partners, from opportunities to results, the group covers all activities and is able to provide reliable support services to our customers.

All these capacities build on the diversity and preparedness of our people. Our experts cover a wide range of disciplines, from emerging technological areas to social sciences and economics. Teams are multi-disciplinary and multicultural, and are thus able to dialogue with customers and understand their needs. Atos customers can benefit from our groups R&D-related services, such as advanced technology watch, innovations ideas channeling, evaluation and management alignment of the organization’s R&D strategy with public funding sources programs, proposal drafting and delivery, proposals negotiation and proper project management office.

Objectives and organization

ARI structure is designed to favor collaboration with Atos sales teams

The Research & Innovation group is the R&D hub for new technologies and a key reference for the whole Atos group. Thanks to our large expertise in research, development and innovation projects, we are able to bring new solutions and innovative elements to customers’ business. The group focuses on projects development, combining economic exploitation of investigations’ results and the most up-to-date technological achievements with high awareness of human and social factors. The main objectives of the Research & Innovation group are to:

- Participate in research, development and innovation (RDI) projects that enrich Atos offer portfolio, market view or position with respect to emerging technologies.
- Be a source of innovative solutions to be used by Atos sales force and technical staff.
- Become an entry gate to European institutions for the different units and customers of Atos, thanks to the large background of European Commission projects since 1987.
- Support Atos business units in other countries, as well as their customers, thanks to the network of public and private partners across Europe, which in turn, are current or potential customers of the company.
- Our team is distributed in various locations: Madrid, Barcelona, Bilbao, Sevilla, Valladolid, Santa Cruz de Tenerife in Spain, Brussels in Belgium, Istanbul and Ankara in Turkey. The group is structured in a way to facilitate the relationships with the different Markets and Service Lines of the company. Thus, we are organized in ten Sectors within Atos established markets and six Technological Labs. The structure fosters the alignment of emerging technology research and development with the market/customer needs. Our ultimate goal is to be at the forefront of R&D in Digital Technologies, with a deep knowledge of business and societal challenges.
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Capabilities

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The following diagram shows the structure of Atos management staff. A head of market coordinates all R&D activities related to Atos main markets and guarantees fluid communication with commercial staff and customers.

**Structure**

- **Direction**
  - Alicia García

- **Business Development**
  - Lydia Montandon

- **Technology Transfer**
  - Aljosa Pasic

- **ICT Program Management**
  - Nuria de Lama

- **Financial Office**
  - Adolfo Alonso

- **Technical Coord.**
  - Angel Sáez

- **Health**
  - Blanca Jordán

- **Telecom & Media**
  - Josep Martrat

- **Public Administration**
  - Ana Prieta

- **Financial Services**
  - Pedro Soria

- **Information Technologies**
  - Clara Pezuela

- **Energy & Transport**
  - Andrea Rossi

- **Manufacturing, Retail & Environment**
  - José Lorenzo

**Sectors**
Financial services
Adapting to the challenges of Future Internet and new ICTs

Description
The world of Financial Services applications is changing due to the increased openness of IT environments, mergers and acquisitions, and above all, significant challenges brought on by customer and market dynamism. The FS sector searches for the right answer to these changes and challenges by doing research into the Future of Financial Services.

For more than ten years, R&D projects have been developed in order to ensure secure transactions, provide higher availability, confidentiality and integrity of financial services, and in recent times new trends like Big Data, IoT, and Competitive Intelligence are also paving new research in information management for financial services.

Goals
The goal of this sector is to ensure transition and explore the application of our research & innovation solutions in the financial services industry. These solutions are rooted in our activities in information security, semantic technology for the real-time processing of data (e.g. news and transactions, among others) and smart city technologies.

The Research & Innovation Financial Services sector feeds requirements, business concerns and challenges of the Financial Services industry to motivate research activities in multiple areas of work, while also opening opportunities for exploitation of research outcomes in banking, insurance, and financial services.

Main activities
- Helping Financial Services customers identifying R&D challenges and driving them into requirements for new R&D projects.
- Promotion of project results and developed assets to Atos customers in the Financial Services sector.
- Development of ICT systems and platforms that support innovation in Financial Services, both in their operation and in their business models.
- Elaboration of plans for the exploitation of research project results in the Financial Services market.

Challenges
Customers in the Financial Services market are faced with challenges of both technical and business nature that call for ICT-based solutions.

- Adapting business models to an economy more and more driven by management of information.
- Taking stock of the vast amounts of information owned by banks, to be exploited for the business and operational benefit of the organization.
- Security concerns over the use of emerging technology business models (e.g. cloud computing).
- Exploiting the potential of mobile and social networking technologies in banking, and in insurance.
- Management of compliance in a highly regulated business environment.

Current Research Topics and Findings
- Analysis of large amounts of information to derive intelligence for enhanced competitiveness and improved operational efficiency.
- Data trends and sentiment analysis.
- Security in cloud computing, allowing the adoption of models such as SaaS, PaaS and IaaS (identity as a service) by the Financial Services industry largely reliant on legacy technologies.
- Privacy-enhancing technologies and advanced cryptography approaches as building blocks for privacy-enhancing identity management and data management in trusted and untrusted domains.

<table>
<thead>
<tr>
<th>Title</th>
<th>Project Title</th>
<th>Funding</th>
<th>Description</th>
<th>Web</th>
</tr>
</thead>
<tbody>
<tr>
<td>CYSPA</td>
<td>European Cyber Security Protection Alliance</td>
<td>FP7</td>
<td>Addressing trustworthiness of ICT through a European strategy to protect cyberspace, with target audiences ranging from research communities and industry to public authorities and infrastructure operators.</td>
<td>cyberspa.eu</td>
</tr>
<tr>
<td>WITDOM</td>
<td>Empowering privacy and security in non-trusted environments</td>
<td>H2020</td>
<td>Automatic and efficient privacy provisioning solutions, keeping data confidential in the untrusted environment, while the data owner can operate with and make use of the data in the unencrypted domain.</td>
<td>witdom.eu</td>
</tr>
</tbody>
</table>

Pedro Soria
Head of Market

Elsa Prieto
Head of Sector
Health

Responding to the challenges of ageing populations on the increase of chronic diseases and shortage of healthcare workers

Description

The Health sector counts with more than 15 years of experience in developing research and innovation projects related to life and care sciences, in topics like medical images treatment and analysis, information management, EHRI interoperability, artificial intelligence for decision support systems creation, remote monitoring and patient assistance. In the last years, we are focusing on big data, nanotechnology, algorithms and big data development for omics data analysis.

Goals

- Research on the application of ICT to the health domain for the improvement of services for professionals and patients. Precision Medicine.
- Direct application of knowledge and research results to the development of innovative solutions and services.
- Technology transfer from research projects to Atos customers in the field.

Main activities

- Connected Health and care.
- Big data for Omics Technologies and data analysis.
- Big data for services within the healthcare domain.
- Data-driven health transformation.

Challenges

- The inclusion of relevant standards for medical devices communication and electronic health records. This relates to the integration of widely used health dictionaries such as SNOMED and LOINC with the most accepted standards for medical devices such as IEC, IEEE 11073 and openEHR, ISO/EN 13606, HL7 and PHR for data interoperability.
- Omics Technologies: Analysis and integration of omics data, including the complete set of processes and biochemical reactions related to biological processes (metabolomics), allowing to reach a surprising understanding of the complex cellular system. The ever-increasing data generated by these technologies are having a great impact in the biomedical research framework, as well as in the clinical practice.

Current Research Topics and Findings

- Services to exchange, integrate and analyse huge amounts of data collected from different sources into a global information infrastructure or ‘infrastructure’ addressing semantic and standard interoperability, cloud and grid computing, network agility.
- Algorithms to model data and simulate physiological behavior, and to extract information from the model/simulation.
- Sensors networks to gather different physiological and environmental/localisation data (Internet of Things).

Title | Project Title | Funding | Description | Web
--- | --- | --- | --- | ---
ACANTO | A cyberphysical social network using robot friends | H2020 | Using robotics to increase the number of older adults who engage in a regular and sustained physical activity | acantoproject.eu
AHEAD | Augmented hearing exposure to and assistance for daily life | AAL | Integration and combination of advanced sensing devices and ICT based modules, using eyeglasses and hearing aid as a support for assisting elderly people. | aheadproject.eu
ALFRED | Interactive assistant for independent living and active | FP7 | Development of a mobile personalized assistant for elderly people enabling them to remain independent, facilitating coordination with their caregivers and promoting social inclusion | alfried.eu
CrowdHealth | Collective wisdom driving public health policies | H2020 | Integration of high volumes of health related heterogeneous data from multiple sources with the aim of supporting policy making decisions. | crowdhealth.eu
DAPHNE | Data as a Service platform for healthy lifestyle and preventive medicine | FP7 | Development of a platform to deliver personalized guidance services for lifestyle management to the citizen/patient. | daphne-fp7.eu
FACET | Frailty care and well-functioning | EITH | Development of a tool to integrate and query human phenotypic data in order to early detect frailty. The goal is to permit intervention on and the associated diseases to prevent or delay the onset of disability. | facetproject.eu
HAVISO | Enhanced visibility and awareness in Health, active ageing and independent living projects | FP7 | Fostering a common strategy for joint dissemination activities and exploitation plans for eHealth, Active Ageing and Independent Living Projects | haviso.eu
HarmonicSS | Harmonisation and integrative analysis of cohorts on primary Sjogren’s Syndrome | H2020 | Development of a platform with open standards and tools, designed to enable secure storage, governance, analysis and controlled sharing of information of primary Sjogren Syndrome. | harmonicss.eu
HeartMan | Personal decision support system for heart failure management | H2020 | Development of a personal health system for congestive heart failure (CHF) that features a Decision Support System based on predictive computer models. | heartmanproject.eu
PARHOS | Platform for advanced predictive health operational systems | EITH | Implementation of a secure platform that allows different actors involved in the healthcare chain to move from the reporting to prediction and prescription focusing on multimorbidity treatment combining medical data records with patient monitoring | parhosproject.eu
WITHME | European platform to promote healthy lifestyle and improve care through a personal persuasive assistant | ARTEMIS | Provision of a health prevention platform and personalized services to improve patients’ general health conditions and prevent occurrence of a range of diseases. | withmeproject.eu

Head of Sector

Blanca Jordan

Deputy Head of Sector

Manuel Pérez
**Information Technologies**

**Building the future Internet to address the major challenges of society and enterprises**

**Description**

The Information Technologies (IT) sector addresses the IT market, including software companies, solutions integrators and software consultants.

This sector is strongly linked to the "Next Generation Cloud" Lab and "Software Engineering" formal research line. While the lab and research line concentrate on research projects and most of the technological developments, the sector is more focused on innovation and technology transfer projects. It also provides the required support for the management of the projects and the exploitation of research results.

**Goals**

The sector has a twofold objective: on one hand, fostering the adoption and transfer of emerging technologies surrounding Cloud and Edge Computing, Software and Service Engineering, Digital Platforms and recently Robotics to Atos business units, to align the research activity with customers’ needs; providing added value solutions to be included in the company’s portfolio; and on the other hand, promoting the use of produced R&D assets in the IT sector related market.

**Main activities**

- Research and development activities dealing with IT challenges, through the active participation in market driven R&D projects.
- Collaboration with related Atos Business Units to collect requirements and provide them results and components from R&D projects.
- Transfer the obtained research results to Atos, through Business Development, Scientific Community, Centers of Excellence and Market Leaders.
- Developing support actions to create roadmaps for challenges in the domain of ICT, with focus on cloud, robotics and software engineering.

**Challenges**

- Implementation of Computing Continuum concept by research in Cloud Integration, Multi-cloud, Edge Computing and Swarm Computing.
- Efficient management of IoT, Edge and Cloud, providing a significant step toward massively distributed computing models.
- Software Engineering techniques for software modelling and development, with focus on self-adaptive software in complex systems.
- Digital Platforms for the Future Internet, by using FIWARE as baseline technology, to different verticals in Smart Cities, Smart Industry, Health and others.
- Use of Artificial Intelligence by adding an adaptive control layer to tame the complexity arising from the interplay between IoT, connected homes and cars, autonomous robots and cloud and edge computing, and allow organizations to manage operations through real-time data-driven decisions and natural human computer interaction.
- Deployment of Open Source models, development and processes.

**Current Research Topics and Findings**

The sector’s research activities are focused on being an active part of the future roadmaps definition in different domains (Future Internet, Green IT, Service, Cloud, Software Engineering, AI, Robotics, Big Data (IoT) etc) materialized through the participation in several initiatives and platforms such as PLANETIC, MESI, BENA, EIT Digital, among others. While the lab and research lines are more focused on research in the short term the sector participates in the definition of a longer term view, driving the principal market needs towards the lab.

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<tr>
<th>Title</th>
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<tbody>
<tr>
<td>ARTIST</td>
<td>Advanced software-based service provisioning and migration of legacy software</td>
<td>FP7</td>
<td>Set of methods, tools and techniques that facilitate the transformation and modernization of legacy software assets and businesses. <a href="mailto:artist-project.eu">artist-project.eu</a></td>
</tr>
<tr>
<td>Ellasent</td>
<td>An elastic platform to ease end to end testing</td>
<td>H2020</td>
<td>Tool for helping developers to test and validate complex distributed systems, based on three principles: test orchestration, instrumentation, and test recommendation. <a href="mailto:ellasent.eu">ellasent.eu</a></td>
</tr>
<tr>
<td>FI-NEXT (FIWARE)</td>
<td>Bringing FIWARE to the next step</td>
<td>H2020</td>
<td>Development of applications and services based on FIWARE platform which has demonstrated its potential of becoming a service platform of choice. <a href="mailto:fiware.org">fiware.org</a></td>
</tr>
<tr>
<td>McCloudData5</td>
<td>Multi Cloud Data Analytics as a Service</td>
<td>ETF DIGITAL</td>
<td>Extending the benefits of Big Data Analytics to Multicloud environments offering innovative functionalities with regards to security, scalability and fault-tolerance. <a href="mailto:mclouddata5.eu">mclouddata5.eu</a></td>
</tr>
<tr>
<td>Megafort</td>
<td>Mega modeling at runtime</td>
<td>ECSEL</td>
<td>Scalable model-based framework for continuous development and runtime validation of complex systems. <a href="mailto:megafort.eu">megafort.eu</a></td>
</tr>
<tr>
<td>PLANETIC</td>
<td>Plataforma tecnológica para la adopción y difusión de las tecnologías de información, electrónica y de comunicación</td>
<td>Spanish Ministry of Economy and Competitiveness</td>
<td>Spanish technology platform for the adoption and promotion of electronic communication and information technologies. <a href="mailto:planetic.es">planetic.es</a></td>
</tr>
<tr>
<td>SLA-DO</td>
<td>Legal &amp; open modal terms for cloud SLA and contracts</td>
<td>H2020</td>
<td>Provision of two SLA reference models for cloud computing, site for cloud SLA legal contracts, and the other for technical SLA specifications. <a href="mailto:sla-do.eu">sla-do.eu</a></td>
</tr>
<tr>
<td>Smart Fi (CityGO)</td>
<td>Exploiting aggregated open data from Smart Cities for the future internet society</td>
<td>EMA-NET Smart Cities</td>
<td>Platform to deploy services exploiting aggregated open data from smart cities, providing methodologies to homogenize heterogeneous open data and data services, analytics to predict patterns and make recommendations. <a href="mailto:smart-fi.eu">smart-fi.eu</a></td>
</tr>
<tr>
<td>STAMP</td>
<td>Software testing amplification</td>
<td>H2020</td>
<td>Advanced research in automatic test generation, by pushing automation in DevOps one step further, and reusing existing assets to generate more test cases and configurations when the application is updated. It brings amplification services at unit level, configuration level and production stage. <a href="mailto:www.stamp-project.eu">www.stamp-project.eu</a></td>
</tr>
<tr>
<td>SUPERSEDE</td>
<td>Supporting evolution and adaptation of personalized software by exploiting contextual data and end user feedback</td>
<td>H2020</td>
<td>Feedback driven approach for software lifecycle management, with the ultimate purpose of improving users’ quality of experience. <a href="mailto:superease.eu">superease.eu</a></td>
</tr>
<tr>
<td>Synchronicity</td>
<td>Delivering an IoT enabled digital single market for Europe and beyond</td>
<td>H2020</td>
<td>Harmonized ecosystem for IoT-enabled smart city solutions where IoT device manufacturers, system integrators and solution providers can innovate and openly compete. <a href="mailto:synchronicity.eu">synchronicity.eu</a></td>
</tr>
</tbody>
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Clara M Peusela  Head of Market
The new energy scenario: welcome to the century of digitalized energy systems

Description

The way we are generating, distributing, and using resources (electricity, water, oil, and gas) in Europe has changed dramatically in the new century. Specifically in the energy sector due to new opportunities to generate and store renewable energy and the declining of fossil and nuclear energy sources together with the introduction of smart energy grids and European deregulation. Embracing the 3 Energy Ds (Decentralization, Decarbonisation, and Digitalisation) requires the participation of new players. Their role as incumbents is changing fast and supports traditional players to evolve towards a more sustainable energy ecosystem. An ICT-driven marketplace is already available for all energy actors and stakeholders that should be guided towards a process of digital transformation. ICT energy systems and applications are at the very core of these changes, being the key enablers for smart energy innovation.

Goals

The main goal is to deliver research & innovation initiatives across the entire energy value chain with focus area covering the major challenges faced by the main players and stakeholders, spanning across every segment of the energy market (electric, water, oil, and gas) thus driving the digital transformation of the European energy industry.

Main activities

Activities are driven by the application in the energy domain of advanced ICT-smart systems and technologies:

- Electric distribution network: advanced smart grid automation together with control and management of distribution networks. Paying the way so as to anticipate the increased use of distributed energy generation and storage. Adaption to Demand Response requirements.
- Microgrids and Nanogrids: the introduction of distributed energy resources supports the establishment of regional microgrids or local nanogrids, aggregating and largely autonomously controlling their own supply and demand side resources.
- Electric vehicles: the large-scale penetration of electric and hybrid vehicles requires interaction between the energy infrastructure, the transport infrastructure, the vehicle information systems and the communication network infrastructure. This means collecting, processing, and delivering all the needed information.
- Efficient Water Management: oriented to urban and rural areas through the implantation of smart ICT application and services for water utilities and consumers.
- Energy sector main findings come hand by hand with ongoing projects, as listed below, aiming at bringing together relevant aspects of future ICT smart energy systems:
  - Integration of cutting-edge technologies, solutions, and mechanisms in a scalable Cross-Functional Platform connecting energy networks with diverse stakeholders, facilitating optimal and dynamic operation of the Distribution Grid (interGRIDy).
  - Interoperability network that connects the capacities of the neighbourhood and wide regional Renewable Energy Sources plus Electrical Energy Storages (EES) ecosystems into a collaboration framework that mitigates the requirement of the overall EES capacities thanks to the shared capacities among the participating actors (SHAQ-O).
  - Sustainable integration of electric vehicles (EVs) in cities supported by ICT tools for managing the availability of vehicles, charging spots and parking places, and brokering energy to assure proper provision and availability of energy to meet supply needs (ELVITEN).
  - Deployment of a distributed ICT infrastructure, combining invehicle and cloud based approach collecting and processing data generated by the vehicles, and distributing commands for optimizing energy consumption of the different climate systems (Heating, Ventilation, and Air Conditioning) for reaching a global energy savings of 50% (CPS4).

Andrea Rossi
Head of Sector
Emerging geospatial technologies that support the development of distributed geo-spatial processes

Description

The Environment sector covers research and innovation for environment and focuses its activity on the design and implementation of information architectures oriented towards the seamless geospatial data distribution and execution of distributed geospatial processes, to improve Natural Risk Management.

Since 1999, the team has developed a large number of consultancy and research projects dealing with the use of the current geographical information standards and used in many cases with the European Policy Initiatives in this field (e.g. INSPIRE).

Goals

Our main goal is to promote the adoption of emerging geospatial technologies that support the development of distributed geo-spatial processes. Therefore, the Environment sector is strongly linked to the Geospatial Information Research Line, where an important part of the technological activities are developed.

Main activities

- Research and development activities dealing with environmental challenges. This is mainly done through the active participation in market-driven R&D projects with geospatial technologies.
- Integration of in situ & EO observations from environmental sensors.
- Expertise on INSPIRE standards (WFD, WFD, WPS, WGS, SWE, etc.).
- Implementation of geolocation-independent decision support and alerting systems for the prevention of disasters.
- Elaboration of business plans for the exploitation of research project results, oriented to the environment sector.

Challenges

- Earth Observation and Security. Extend the activity to Earth Observation and Security through the provision of inputs to the Copernicus and GEOSS initiatives.
- Multiple Risk Management. Extend the achievements reached in the FP7 project ORCHESTRA to multiple risk and emergency domains (e.g., early warning and tourism in FP7 project SafeTour, biodiversity, cultural heritage, agriculture and many other domains).
- Observation Web. The research challenge to realize the Observation Web and the associated environmental services for the Future Internet leveraged by the work done in the Environmental Usage Area within the Future Internet PPP program of the European Commission.
- INSPIRE adoption. To be a reference partner for the Public Administration in the developments needed to adopt the INSPIRE directive.

Current Research Topics and Findings

- Research use of Earth Observation Data for wildlife monitoring
- Creation of value from Copernicus data through the provisioning of modelling and analytics tools
- Climate change adaptation measure planning and decision support
- Secondary raw materials inventory
- Open Data and Big Data building on geospatial information
- Driving innovation in crisis management
Homeland Security & Defence

Promoting innovative solutions and emerging technologies for the protection of citizens, goods and infrastructures

Description

The sector of Homeland Security & Defence (HSD) coordinates the research and the commercial exploitation of assets produced by the group targeted to industry and public institutions in the defense and security arena, especially to the homeland security field Ministry of Interior, the National and Regional Police Forces and also all types of organizations that address or deal with crisis management, crime fighting, law enforcement and border intelligence.

Goals

The main goal is to encourage the adoption of emerging technologies in the Homeland Security & Defence sector, as well as identify business opportunities for Atos when these involve issues such as crisis management, emergency services, protection of citizens, goods and infrastructures, border surveillance and management, or ICT support for law enforcement.

Main activities

- Promotion of project results and developed assets to Atos customers in Homeland Security & Defence
- Identification and pursuing new business opportunities in HSD in line with Atos innovative key digital services
- Management of market-driven R&D projects, elaboration of plans for the exploitation of research project results oriented to security and civil protection

Current Research

Title | Project Title | Funding | Description | Web
--- | --- | --- | --- | ---
ZONeSEC | Towards a EU framework for the security of widelanes | FP7 | Addresses widelanes surveillance defining a European framework taking into consideration costs, complexity, vulnerability, societal acceptance and ethics | zonesec.eu
TOXI-TRIAGE | Integrated and adaptive responses to toxic emergencies for rapid triage: engineering the roadmap from casualty to patient to survivor | H2020 | It merges technologies from clinical medicine with practices of search and rescue into an integrated concept of operation for crisis management in a catastrophic CBRN incident | toxitriage.eu
DRIVER | Driving innovation in crisis management for European resilience | FP7 SECURITY | Improving Crisis Management at Member State and EU level covering societal resilience, strengthening first responders and training | driverproject.eu
ResiStand | Increasing disaster resilience by establishing a sustainable process to support standardisation of technologies and services | H2020 | Drafting a roadmap for the empowerment of Crisis Management and European disaster resilience through standardisation | resistand.eu
TONI TRIAGE | Integrated and adaptive responses to toxic emergencies for rapid triage: engineering the roadmap from casualty to patient to survivor | H2020 | It merges technologies from clinical medicine with practices of search and rescue into an integrated concept of operation for crisis management in a catastrophic CBRN incident | tomitriage.eu
CEBOLA | Proactive enhancement of human performance in border control | H2020 | Focuses on human factors in border lines to enhance the performance of border guards and the travelers’ experience | cebola-project.eu
CIVILEX | Supporting European Civilian Actions | H2020 | Model of the information systems in use within the EU Civilian Missions and provide possible solutions for a future interoperable Situational Awareness, Information Exchange and Operational Control Platform. | civilex.eu
DRIVER | Driving innovation in crisis management for European resilience | FP7 SECURITY | Improving Crisis Management at Member State and EU level covering societal resilience, strengthening first responders and training | driverproject.eu
BODEGA | Proactive enhancement of human performance in border control | H2020 | Focuses on human factors in border lines to enhance the performance of border guards and the travelers’ experience | cebola-project.eu
ALFA | Advanced low flying aircrafts detection and tracking | H2020 | Development of a surveillance system for timely detection and classification of air targets, providing a prediction of landing sites or dropping zones | alfa-h2020.eu

Challenges

- The strategy and technology of the HSD sector is guided by political and strategic planning, such as the Common Security and Defense Policy (CSDP), which is now integrated into the EU Common Foreign and Security Policy (CFSP). Here the challenges are to identify «new» between these guidelines and actions, with emerging future technologies, to explore «dual use» technologies (defense tech applicable in civil security and the other way round) and to deliver more for less (poll resources, cloud-based solutions, data and info sharing, etc.).
- Interoperability and collaboration: HSD organizations are immersed in the development of NATO EDA or other EU cooperation frameworks that span a variety of topics from counter terrorism and crisis management to operational data exchange or cybersecurity. Objectives are to avoid duplications, pool resources and foster EU excellence.
- Exploiting ‘data deluge’ increasing availability of useful information allows the acquisition of knowledge and development of new generations of intelligence applications needed to enhance situational awareness and agility in decision making.

Pedro Soria
Head of Market Sector

Jaime Martín
Deputy Head of Sector
Manufacturing & Retail

Intelligent technologies for manufacturing and retail challenges

Description

The Manufacturing & Retail sector has a deep experience and capacity in multiple areas design and integration of Collaborative Platforms (i.e. for Meta-Products development covering communication tools, PLM, ERP, ALM, PMS, etc.), deployment and management of Manufacturing Ecosystems with special focus on Cyber Physical Production Systems (CPPS). They consider subsequent integration of data with different systems (consumers) and application platforms for development. Big Data applied to manufacturing, security and cloud computing.

The retail sector is one of the biggest users of ICT, and thus a driver for innovation. It has a major role to play in the development of a sustainable economy and also in allowing citizens to face the current economic downturn by giving them easy access to affordable and good quality consumables.

Goals

The main goal is to help companies, in particular SMEs, to adapt to global competitive pressures by improving the technological base of manufacturing and retail technologies and thus a driver for innovation. It has a major role to play in the development of a sustainable economy and also in allowing citizens to face the current economic downturn by giving them easy access to affordable and good quality consumables.

Main activities

We are interested in developing new solutions for a range of activities covering manufacturing processes, the factories of the future approach (Industry 4.0), food tracking & traceability, improvement of retailer business processes and client satisfaction through better information strategies. In particular, we focus on the following activities:

- **Better knowledge of the context in the manufacturing processes.**
- **Technology transfer to improve Atos solutions.**
- **Identification of research opportunities from national and international bodies aligned with Atos commercial divisions’ needs.**
- **Exploitation activities to steer the research towards market needs and exploit research results.**
- **Commercial projects to final customers, including R&D support.**
- **Flexible, rapidly responsive production systems for customized manufacturing.**
- **Smart agri-food. Food chain integrity, making certain that food is traceable, safe to eat, high quality and genuine.**
- **New product information channels using mobile devices for supermarket clients.**
- **To develop Collaborative and Scalable Platforms for Data visualization and analytics.**
- **To improve innovation activity. New ideas have to be transformed into new products and processes.**
- **Better knowledge of the context in the manufacturing process through any kind of sensor or CPPS to support decisions thus optimizing the full process and resources consumed.**
- **Ensure the food chain integrity (from farm to fork) through tracking and traceability.**
- **Interoperability of the value chain IT systems and support to collaborative decision.**

Current Research

**Topics and Findings**

<table>
<thead>
<tr>
<th>Title</th>
<th>Project Title</th>
<th>Funding</th>
<th>Description</th>
<th>Web</th>
</tr>
</thead>
<tbody>
<tr>
<td>CNET</td>
<td>Collaborative cloud manufacturing networks</td>
<td>H2020- FoF</td>
<td>Development of cloud-enabled tools for supporting the supply network, optimization of manufacturing and logistic assets based on collaborative demand, production and delivery plans.</td>
<td>cnetproject.eu</td>
</tr>
<tr>
<td>COMPOSITION</td>
<td>Ecosystem for collaborative manufacturing processes</td>
<td>H2020</td>
<td>Creation of a digital automation framework that optimizes the manufacturing processes by exploiting existing data, knowledge and tools to increase productivity and dynamically adapt to changing market requirements.</td>
<td>compositionproject.eu</td>
</tr>
<tr>
<td>MIDH</td>
<td>Manufacturing Industry Digital Innovation Hubs</td>
<td>H2020- FoF</td>
<td>Digitization of manufacturing industry to boost investment and collaborations through strategic partnership and networking.</td>
<td>midhproject.eu</td>
</tr>
<tr>
<td>OCTAVE</td>
<td>Objective control of talker verification</td>
<td>H2020, SECURITY</td>
<td>Integration of a commercial grade and new hybrid automatic speaker verification (ASV) systems with the latest environmental robustness and anti-spoofing technologies to deliver a scalable, trusted biometric authentication service (TBAS).</td>
<td>octaveproject.eu</td>
</tr>
<tr>
<td>CEDIP</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>REPAR</td>
<td>Future repair and maintenance for aerospace industry</td>
<td>FP7</td>
<td>Research on onsite maintenance and repair of aircraft by integrated direct digital manufacturing &amp; development of a new set of technologies to maximize the benefits of 3D printing systems.</td>
<td>repar.eu</td>
</tr>
</tbody>
</table>

Challenges

The majority (95.8%) of enterprises active within the EU-27’s non-financial business economy in 2008 were SMEs and only a few of them have the research capacity and the financial potential to implement high-risk innovative manufacturing and retail technologies. In this context a variety of challenges emerge:

- **To develop Collaborative and Scalable Platforms for Data visualization and analytics.**
- **To improve innovation activity. New ideas have to be transformed into new products and processes.**
- **Better knowledge of the context in the manufacturing process through any kind of sensor or CPPS to support decisions thus optimizing the full process and resources consumed.**
- **Ensure the food chain integrity (from farm to fork) through tracking and traceability.**
- **Interoperability of the value chain IT systems and support to collaborative decision.**
- **Flexible, rapidly responsive production systems for customized manufacturing.**
- **Smart agri-food. Food chain integrity, making certain that food is traceable, safe to eat, high quality and genuine.**
- **New product information channels using mobile devices for supermarket clients.**

*Jorge Rodriguez*  
Head of Sector
New media and digital content management are strategic growth areas for Atos

Description

The Media sector encompasses two complementary perspectives:

- On one hand there is the media industry (broadcast, content production, press, etc.)
- and on the other, media and gaming technologies such as digital content management, 3D audio and video analysis, Big Data social media analysis, augmented and mixed reality, etc.

In terms of clients, there tend to be either very large media conglomerates and/or broadcasters or small, agile technology companies.

Goals

The main goal is to improve the positioning of Atos in Media, New Media and Digital Content Management. These areas are quickly becoming a strategic growth area for Atos and this will drive the research topics of this sector with a strong market orientation. The design and development of ICT tools that support:

- Multi-platform efficient Media content management, search, retrieval and content distribution.
- Content recommendation and personalized advertising through content characterization, content annotation, data fusion and profiling.
- Rich multimedia user experience.
- Social network analytics.
- Non-leisure gaming and gamification technologies.

Main activities

Besides participating in R&D projects, the Media sector supported Atos Major Events for the 2016 Summer Olympic Games in Rio de Janeiro, Brasil. It also contributed to the Olympic Broadcasting Services webcasting solution for the Winter Olympics 2014 in Sochi and for the second Youth Olympic Games in Nanjing.

We also follow the activities of the New European Media (NEM) initiative.

Challenges

The biggest challenge is to convert the extensive knowledge accumulated by this sector during last years in different R&D projects related to media technologies into assets that are useful to the rest of Atos Group.

- Content annotation and enriched metadata for multimedia.
- Multimedia search, distribution and retrieval.
- 3D and virtual worlds.
- Streaming (P2P, 3D, SVC, MDC, etc.).
- Social media analytics related to media content.

Francesco D’Andria
Head of Sector

Current Research

<table>
<thead>
<tr>
<th>Title</th>
<th>Project Title</th>
<th>Funding</th>
<th>Description</th>
<th>Web</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONCEPT</td>
<td>Collaborative creative design platform</td>
<td>FP7</td>
<td>Implementation of a semantically driven collaboration framework to be integrated into future synchronous collaborative design environments to assist professional industrial designers on the early stages of the design process.</td>
<td>concept-fp7.eu</td>
</tr>
<tr>
<td>Flame</td>
<td>Facility for large-scale adaptive media experimentation</td>
<td>H2020</td>
<td>Development and operation of an experimental infrastructure for media content delivery that combines VSNs and ICN to optimize efficiency and user experience considering the expected demand patterns of the Future Media Internet applications &amp; services.</td>
<td>flame-project.eu</td>
</tr>
<tr>
<td>ProsocialLearn</td>
<td>Gamification of prosocial learning for increased youth inclusion and academic achievement</td>
<td>H2020</td>
<td>Delivery of a series of disruptive innovations for the production and distribution of prosocial games that engage children and technology transfer from the games industry to the educational sector.</td>
<td>prosociallearn.eu</td>
</tr>
<tr>
<td>SMART</td>
<td>Multimedia search and retrieval over integrated social and sensor networks</td>
<td>FP7</td>
<td>Research and implementation of a scalable open source next-generation multimedia search engine that will be able to search information stemming from the physical world.</td>
<td>smartfp7.eu</td>
</tr>
<tr>
<td>Trillion</td>
<td>Trusted Citizen - LEA collaboration over social networks</td>
<td>H2020</td>
<td>Open, flexible, secure and resilient socio-technical platform to foster effective collaboration of citizens and law enforcement officers.</td>
<td>trillion-project.eu</td>
</tr>
</tbody>
</table>

The focus is on the following challenges:

- Metadata, especially for sports (Mpeg, 7 MP)EGL 2.0, SportML, EventML, Major Events)
- Realtime recommender systems
- Personalized Content
- Multimedia search and retrieval
- P2P streaming
- Social media analytics
- Second Screen
- New user interfaces for access to multimedia (multitouch, Kinect, tablet)
- Digital archiving
**Public Administration**

ICT is key to promote smart, sustainable & innovative government

**Description**

The sector builds on the results of previous research in the eGovernment and Education areas, and encompasses three complementary perspectives:

- Helping the public administrations to provide more efficient and effective public services to citizens and businesses.
- Developing solutions to enhance learning. Learning at the workplace, collaborative learning, learning at school, higher education, accessible learning, authoring tools and adaptive learning.
- Developing smart city infrastructures that offer added-value services to citizens to cope with societal challenges and to enable business services.

**Goals**

- Research and development of ICT tools that support public sector administrative processes to deliver seamless and faster public services.
- Adoption of emerging technologies that support new demands for services and contents in education.
- Design and deployment of new ICT tools and integration of existing technologies that allow emerging smart cities to offer sustainable and added-value services.

**Main activities**

- Management of market-driven projects with promotion of project results to Alco’s customers in the Public and Education sector.
- Integration of research results into the public administration legacy systems.
- Development and assessment of new and efficient services for Smart cities, focused on a convergence of physical and virtual infrastructures and open participation.
- Development of ICT tools that implement more efficient services with special focus on interoperability, cross-organizational flows, big and open data, cloud for public administrations, and smart cities.

- Development of ICT tools with strong education orientation focused on personalization; student experience, lifecycle management, and contextualized e-learning.
- Identification and evaluation of new business opportunities in the Public and Education sector with innovative key offerings.

**Current Research Topics and Findings**

<table>
<thead>
<tr>
<th>Title</th>
<th>Project Title</th>
<th>Funding</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RDFa</td>
<td>Big data value ecosystem</td>
<td>H2020</td>
<td>Support the Big Data Value PPP in realizing a vibrant data-driven EU economy and support the implementation of the PPP to be a success.</td>
</tr>
<tr>
<td>Policy Compass</td>
<td>Big Policy Canvas</td>
<td>FP7</td>
<td>Fosters collaboration among Public sector stakeholders and offers a solid knowledge base towards building a more evidence-based public sector promoting transparency and restoring trust to public sector structures.</td>
</tr>
<tr>
<td>CEDUS</td>
<td>City enabler for digital urban services</td>
<td>EIT DIGITAL</td>
<td>Provision of a software relying on the FIWARE open platform for crawling, collecting and rendering on a map valuable data at urban scale as well as rapidly developing urban services.</td>
</tr>
<tr>
<td>ESPRESSO</td>
<td>Systemic standardisation approach to empower smart cities and communities</td>
<td>H2020</td>
<td>Development of a conceptual Smart Cities Information Framework, which consists of a platform and data provision and processing services to integrate data, workflows, and processes in applications relevant for Smart Cities.</td>
</tr>
<tr>
<td>MathIES</td>
<td>Managing affective learning through intelligent agents and smart Interactions</td>
<td>H2020</td>
<td>Integrated platform which provide capabilities for adaptive learning, automatic feedback, automatic assessment of learner’s progress and behavioral state, affective learning and game-based learning.</td>
</tr>
<tr>
<td>NEWTON</td>
<td>Networked labs for training in sciences and technologies for information and communication</td>
<td>H2020</td>
<td>Building a pan-European learning network platform that supports fast dissemination of learning content to a wide audience in a ubiquitous manner.</td>
</tr>
<tr>
<td>Science2Society</td>
<td>Improving university, industry and society interfaces to boost Europe’s innovation stakeholders</td>
<td>H2020</td>
<td>Creation, printing and sharing of good practices, guidelines and training materials to improve awareness and practical performance in university-industry-society interfacing.</td>
</tr>
<tr>
<td>SONNETS</td>
<td>Societal needs analysis and emerging technologies in the public sector</td>
<td>H2020</td>
<td>Delivery of a methodological framework for Public Sector organizations to accelerate its transformation through the identification, analysis and take-up of emerging technologies.</td>
</tr>
<tr>
<td>STRATEGIC</td>
<td>Orchestrate next-generation e-government services</td>
<td>CfP</td>
<td>A cloud enabled framework on various infrastructures with a set of services related to public bodies, opening new horizons in the secure and private migration, adaptation, governance and development of public cloud services.</td>
</tr>
</tbody>
</table>

**Challenges**

- Single European administrative space: Implement the vision of seamless cross-organizational and cross-border services through adoption of technologies.
- More for less: Explore solutions, constraints and applicability with a set of services related to public bodies, opening new horizons in the secure and private migration, adaptation, governance and development of public cloud services.
- Sustainable IT: Explore the role of public administration as an early adopter of technologies such as migration to IPV6, Green IT, etc.
- Open government: Releasing public data and using social data techniques to help people understand how government works and how policies are made.
- Connected government: Explore possibilities of IoT to improve efficiency and enable transformation of e-government processes.
- Learning environments based on serious games, education applications for mobile devices.
- Development, deployment and validation of sustainable and ICT-enabled added value services in smart cities, by leveraging existing technologies in different areas of activity with high potential benefit.

**Topics and Findings**

- Cross border authentication that allows citizens to access eGovernment services by using their national eID.
- Involvement of citizens in policy making processes through innovative non-intrusive technologies.
- Participation of citizens in the policy development process and harmonization of policies across governmental levels (e.g., immigration policy).
- Implementation of web 2.0 government sites that allow interactive information sharing, interoperability and dynamic collaboration of different kinds of users.
- Adaptive learning experience for students; collaborative learning environments, learning/training strategies, platforms to support learning processes and training.

**Head of Sector**

Ana María Píñuela

strategic-project.eu

science2society.eu

newtonproject.eu

sonnet-project.eu

sonnets-project.eu

research-project.eu

commercial-project.eu

sonnets-project.eu

research-project.eu

commercial-project.eu
## Novel network architectures and virtualized software networks

### Description

The Telecom Sector focuses on:

- Developing the technology for future 5G high-speed broadband and mobile network infrastructures.
- Contributing to Network@2020 ETP and the 5G PPP initiative (member of both Steering Boards).
- Fostering the adoption of integrated networks as well as novel Internet architectures and technologies.

This sector seeks the definition and adoption of assets for the telecom industry through Atos sales channels.

Our main partners include key telecom industry players (such as Telefonica, Portugal Telecom, Telecom Italia, Deutsche Telekom, Nokia, Alcatel Lucent, Ericsson, etc.) and cutting edge research centers (CAT, Fraunhofer, IMDEA).

### Goals

- Explore novel network architectures - such as 5G - and the applications these enable.
- Study 5G enabling technologies such as Network Function Virtualization (NFV) and Software Defined Networks (SDN).
- Analyze the impact of virtualization on the telecom landscape, both from technical and business perspectives.
- Align the research activity with the offering and activities of Atos (Next Generation Intelligent Networks, Context-aware mobility, Cloud for Network Function Virtualization, OSS/BSS, etc.) and creating new business opportunities for operators.

### Main activities

From the innovation point of view, Atos is participating in initiatives that bring NFV closer to the market. As far as research is concerned, the combination of NFV and SDN for the construction of the 5G network is one of our main priorities.

The sector is currently involved in several exciting projects that cover a wide range of technological challenges such as NFV and SDN in the framework of 5G as well as Recursive Internet. In particular, we are very proud to participate in five of the first wave of European projects that are currently defining the 5G network to be.

As an IT provider and system integrator with virtualization and cloud expertise, Atos expects to fully take advantage of 5G as a big opportunity to become even more influential in the telecom sector and to our research results with Atos’ global telecom portfolio.

### Challenges

- Next generation communication networks (5G) and innovative networking paradigms (Network Function Virtualization, Recursive Internet).
- Combination of cloud computing and networking. Cloud RAN and Mobile Edge Computing (MEC).
- Global telecom solutions (i.e. Big Data for network management) in complex and heterogeneous environments for ubiquitous and reliable service delivery.

### Current Research Topics and Findings

<table>
<thead>
<tr>
<th>Title</th>
<th>Project Title</th>
<th>Funding</th>
<th>Description</th>
<th>Web</th>
</tr>
</thead>
<tbody>
<tr>
<td>5G NORMA</td>
<td>5G Novel Radio Multi-service adaptive network Architecture</td>
<td>H2020</td>
<td>Development of a novel mobile network architecture providing adaptability in a resource efficient way to handle fluctuations in traffic demand resulting from heterogeneous and dynamically changing services and to changing local context.</td>
<td><a href="http://5gnorma.5g-ppp.eu">5gnorma.5g-ppp.eu</a></td>
</tr>
<tr>
<td>5G CROSSHAUL</td>
<td>The 5G Integrated Fronthaul/Backhaul</td>
<td>H2020</td>
<td>5G integrated backhaul and fronthaul transport network enabling a flexible and software defined reconfiguration of all networking elements in a multi-tenant and service-oriented unified management environment.</td>
<td><a href="http://5gcrosshaul.eu">5gcrosshaul.eu</a></td>
</tr>
<tr>
<td>5GEx</td>
<td>5G Exchange</td>
<td>H2020</td>
<td>Enable collaboration between operators regarding 5G infrastructure services.</td>
<td><a href="http://5gexchange.eu">5gexchange.eu</a></td>
</tr>
<tr>
<td>FED4FIRE</td>
<td>Federation for FIRE</td>
<td>FP7</td>
<td>Open and easily accessible facilities to the FIRE experimentation communities, which focus on fixed and wireless infrastructures, services and applications, and combinations thereof.</td>
<td><a href="http://f4fire.eu">f4fire.eu</a></td>
</tr>
<tr>
<td>PRISTINE</td>
<td>Programmability in Recursive Internet Network Architecture for European supremacy of virtualized infrastructures</td>
<td>FP7</td>
<td>Demonstration of programmable functions in a recursive Internet environment for several use cases (security, QoS, congestion control).</td>
<td><a href="http://pristine.eu">pristine.eu</a></td>
</tr>
<tr>
<td>SESAME</td>
<td>Small Cells Coordination for Multi-tenancy and Edge Services</td>
<td>H2020</td>
<td>Small cells for 5G equipped with computing capabilities are exploited for network management and service delivery enhancement.</td>
<td><a href="http://sesame-h2020-5g-ppp.eu">sesame-h2020-5g-ppp.eu</a></td>
</tr>
<tr>
<td>SONATA</td>
<td>Service Programming and Orchestration for Virtualized Software Networks</td>
<td>H2020</td>
<td>SDN and a modular orchestration of network services for bringing NFV closer to the market in the framework of 5G.</td>
<td><a href="http://sonata-nfv.eu">sonata-nfv.eu</a></td>
</tr>
<tr>
<td>T-NOVA</td>
<td>Network Functions as a-Service over Virtualised Infrastructures</td>
<td>FP7</td>
<td>Design and implementation of an integrated architecture for the automated management of Virtualized Network Functions over NetworkIT infrastructures.</td>
<td><a href="http://t-nova.eu">t-nova.eu</a></td>
</tr>
</tbody>
</table>

### Challenges

- Network Function virtualization (NFV).
- Mobile Edge Computing (MEC).
- Large scale federation of Future Internet tasks and services for experimental purposes.
- Recursive Internet paradigms.

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Josep Martrat
Head of Sector
Innovation is essential if supply chain stakeholders are to remain competitive

Description

Logistics is the backbone of economic activity and growth. It represents 10-15% of global GDP and has made enormous impacts in terms of globalization and free trade as both an enabler and as an outcome. Moreover, supply chains are highly productive of data and yet those data involve different information systems, different user requirements, different business models and different deployment trajectories. The Transport & Trade Logistics sector covers a range of activities to deliver advanced IT services, fast and robust solutions for the implementation, integrating interoperability, security, resilience and real-time optimization that enables the cost-effective, green and secure transit of goods through the Global Supply Chain and the urban logistics environment. Supply chain innovation is essential if manufacturing organizations are to remain competitive.

Goals

Our research goals focus on achieving competitive advantage required by supply chain stakeholders in times of rapid change to have a clear understanding of the direction of change, challenges and its implications for business or supply chain mechanisms.

- Advanced technology research, development, testing and evaluation to evolve and improve the mechanisms, business and security in the transport of goods in air, land and sea environments.
- To collaborate and work on relevant research projects.
- To disseminate and transfer relevant research findings in the logistics domain.

Main activities

- Enable the interoperability and integration of systems, delivering cost reductions, greater efficiency and enhanced security.
- Development of enabling to unlock the real-time information exchange across suppliers, manufacturers, logistics providers and retailers without necessitating costly interfaces.
- Usage of open standards and lightweight communication mechanisms to expose a collaborative environment in the logistics sector.
- Encourage the exploitation of these best practice results through a targeted dissemination campaign aimed at decision makers in the logistics industry.

Goals

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- Usage of open standards and lightweight communication mechanisms to expose a collaborative environment in the logistics sector.
- Encourage the exploitation of these best practice results through a targeted dissemination campaign aimed at decision makers in the logistics industry.

Challenges

- Supply chain visibility and transparency - Accurate data
- Enable the interoperability and integration of systems, delivering cost reductions, greater efficiency and enhanced security.
- Development of connectivity infrastructure for collaborative and efficient data sharing among all stakeholders in the logistics sector.
- Supply Chain Resilience - Develop the essential tools and processes necessary to create a capability of “design for resilience”.
- Security and facilitation

Current Research Topics and Findings

<table>
<thead>
<tr>
<th>Date</th>
<th>Project Title</th>
<th>Funding</th>
<th>Description</th>
<th>Web</th>
</tr>
</thead>
<tbody>
<tr>
<td>AEO</td>
<td>Architecture for european logistics information exchange</td>
<td>H2020</td>
<td>Cloud platform aiming to enable the data visibility and data sharing in end-to-end logistics, making the transport of goods across Europe more efficient and sustainable while reducing energy consumption by more than 30%.</td>
<td>newbits-project.eu</td>
</tr>
<tr>
<td>AUTOMAT</td>
<td>Automotive big data marketplace for innovative cross-sectorial vehicle data services</td>
<td>H2020</td>
<td>Novel and open ecosystem in the form of a cross-sector Vehicle Big Data Marketplace that leverages currently unused information gathered from connected vehicles.</td>
<td>automat-project.eu</td>
</tr>
<tr>
<td>CORE</td>
<td>Consistently optimised resilient ecosysterm in the supply chain</td>
<td>FP7</td>
<td>Integrates interoperability, security, resilience and real-time optimisation to produce cost-effective, fast and robust solutions that will guarantee the efficient and secure transit of goods through the worldwide Supply Chain.</td>
<td>coreproject.eu</td>
</tr>
<tr>
<td>FREVUE</td>
<td>Freight electric vehicles in urban Europe</td>
<td>FP7</td>
<td>Demonstration to industry, consumers and policy makers of how electric freight vehicles can provide a smart, clean and efficient solution to transport-related challenges currently affecting European cities.</td>
<td>frevue.eu</td>
</tr>
<tr>
<td>HOPE</td>
<td>Holistic personal public eco-mobility</td>
<td>FP7</td>
<td>Open platform capable of combining Interoperable Fare Management and Traveler Information Systems.</td>
<td>hope-eu-project.eu</td>
</tr>
<tr>
<td>NEWBITS</td>
<td>New business models for ITS</td>
<td>H2020</td>
<td>Provide a deep understanding of the changing conditions and dynamics that affect and/or influence C-ITS innovation.</td>
<td>newbits-project.eu</td>
</tr>
<tr>
<td>TT</td>
<td>Transforming transport</td>
<td>H2020</td>
<td>Big Data Value Lighthouse project working on finding a more efficient and more sustainable transport paradigm, to show concrete, measurable and verifiable evidence of data value that can be achieved in mobility and logistics.</td>
<td>transformingtransport.eu</td>
</tr>
</tbody>
</table>

Germain Herrero
Head of Sector
Advanced Parallel Computing

Enabling future parallel applications

Description

Many industrial scenarios require very advanced computation capabilities due to the big amount of data to be analyzed and to the complex calculations to be performed. High Performance Computing (HPC) is a technology that is bringing the industry to a new era through the use of simulations, advanced modeling, and improved visualization to improve the engineering and manufacture of new products.

As the technology is evolving and the problems to solve become more complex, it is necessary to provide the technology for future exascale applications, which will have new requirements for scaling up the amount of resources to be used. HPC systems become more heterogeneity and aim at optimizing energy consumption.

Goals

The main objective of the research we carry out is to manage parallel computing resources in a smart way while, at the same time, we enable the usage of the technology:

- Optimize resources management for large systems, assigning the adequate resources to the applications to be run and dealing with non-functional aspects;
- Facilitate access to HPC resources, thanks to portals and frontends which hide the complexity to the end users;
- Create and adopt new tools able to use the parallel computing capabilities of HPC systems, especially in the field of parallel (transactional) data analytics;
- Research on new ways to perform parallel computation, learning how to use them.

Main activities

We are focused on solutions that can deal with the current issues in HPC, taking into account the coming problems in future Exascale systems while, at the same time, we are already working in solutions for extreme data analytics using parallel computing resources:

- Orchestration of applications for performing optimal deployments and execution, deriving some tasks to Cloud HPC resources whenever it is convenient;
- Provision of portals and frontends for easy access and usage of HPC resources, integrating data management tools, experimentation tools, community management, and applications marketplace;
- Development of our parallel Complex Event Processing (CEP) engine for real-time data analytics, able also to work in low-power computing devices.

Challenges

- Technologies for Exascale Computing:
  - Optimal resources management, allocating the right resources to the applications;
  - Enable usage of highly scalable applications, taking into account potential bottlenecks;
  - Deal with heterogeneous systems, adopting acceleration devices.

- Easing the usage of HPC for different domains:
  - Tools for large and complex data analytics, parallelizing data processing;
  - Ease execution of experiments in different domains, giving transparent access to HPC;
  - Find new application domains where HPC is a tool to exploit.

- New technologies for parallel computing:
  - New Quantum Computing technologies and quantum algorithms;
  - Future Neuromorphic Computing solutions, as a new way of computation.

Current Research Topics and Findings

- New programming models, domains specific languages, programming paradigms, etc. for parallel applications.
- New Quantum Computing technologies and quantum algorithms.
- Future Neuromorphic Computing solutions, as a new way of computation.
- Hybrid HPC infrastructures with energy-efficient accelerations for HPCaaS.
- Parallel data analytics in (near) real-time, also in embedded HPC, with our parallel CEP.
- Non-functional properties management (monitoring, energy-efficiency, QoS, etc.).
- Usage of accelerators / heterogeneous devices (GPU, FPGAs, ...).
- Dynamic applications profiling and allocation for an optimal execution.
Cybersecurity

Addressing security, trust and privacy to ensure the security of citizens and organizations

Description

Trustworthy, secure and reliable ICT systems are crucial for a wide take-up of converging digital services and a global requirement for the reliable and undisturbed functioning of our information society.

In this scenario, the Cybersecurity (CS) lab is an interdisciplinary group that conducts research in trust, security and privacy domains for the improvement of information technology security as well as the increase of trust and dependability in systems and services.

Goals

Our ambition is to coherently address security, trust and privacy from a technological perspective, in an effort to ensure innovation in the field of secure software development, secure service composition and secure service delivery. The goal is to find solutions for ensuring the security of citizens and organizations from threats such as terrorism, natural disasters and crime, while respecting fundamental rights, such as privacy.

Our research areas include, among others: cyber security, compliance & policy management, secure software engineering, security in virtualized environments, automated reconfiguration of security and high performance Security Information and Event Management (SIEM) systems.

Main activities

- Innovative security mechanisms (e.g. dynamic or adaptive features).
- Compliance & Policy Management.
- Security & Privacy in Social Networks.
- Security in shared service applications and infrastructures such as Cloud.
- Applying Machine Learning to Advance Cybersecurity Analytics.
- Security & Privacy in Social Networks.
- Security of ICT in large distributed IT systems (sensor networks, interconnected critical infrastructures).
- Information exchange, interoperability and data fusion for situational awareness.
- Context-aware security and context-aware privacy protection.
- Digital forensics (e.g. forensics in Cloud).

Challenges

- Security of IoT and IIoT devices.
- Critical Infrastructures protection.
- Security in shared service applications and infrastructures such as Cloud.
- Applying Machine Learning to Advance Cybersecurity Analytics.
- Security & Privacy in Social Networks.
- Security of ICT in large distributed IT systems (sensor networks, interconnected critical infrastructures).
- Information exchange, interoperability and data fusion for situational awareness.
- Context-aware security and context-aware privacy protection.
- Digital forensics (e.g. forensics in Cloud).

Current Research Topics and Findings

<table>
<thead>
<tr>
<th>Title</th>
<th>Project Title</th>
<th>Funding</th>
<th>Description</th>
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</tr>
</thead>
<tbody>
<tr>
<td>CPSEC</td>
<td>Enhancing critical infrastructures protection with innovative security framework</td>
<td>H2020</td>
<td>Creation of an unified security framework that orchestrates state-of-the-art heterogeneous security products to offer high levels of protection in Information Technology and Operational Technology departments of Critical Infrastructures.</td>
<td>cpsec.eu</td>
</tr>
<tr>
<td>COMPOSITION</td>
<td>Ecosystem for collaborative manufacturing processes</td>
<td>H2020</td>
<td>Creation of a digital automation framework that optimizes the manufacturing processes by exploiting existing data knowledge and tools to increase productivity and dynamically adapt to changing market requirements.</td>
<td>composition-project.eu</td>
</tr>
<tr>
<td>DISEM</td>
<td>Diversity enhancements for security information and event management</td>
<td>H2020</td>
<td>Enhance existing SIEM systems with diversity-related technology to improve the quality of events collected, add support for collecting infrastructure-related information, create new ways for visualising the information, and allow the use of multiple storage clouds for secure long-term archival.</td>
<td>disem-project.eu</td>
</tr>
<tr>
<td>SMESSEC</td>
<td>Cybersecurity for small and medium-sized enterprises</td>
<td>H2020</td>
<td>Develop a cost-effective suite of cyber security tools to support SMEs in managing network information, security risks and threats while identifying opportunities for implementing secure, innovative technologies for the digital market.</td>
<td>smessec.eu</td>
</tr>
<tr>
<td>STOP-IT</td>
<td>Strategic, tactical, operational protection of water infrastructures against cyber-physical threats</td>
<td>CIP</td>
<td>Focuses on the strategic, tactical and operational protection of critical water infrastructures against physical and cyber threats by bringing together a strong team of partners from Europe and Israel to develop solutions to the most pressing threats.</td>
<td>stop-it-project.eu</td>
</tr>
<tr>
<td>TREDISEC</td>
<td>Trust aware reliable and distributed information security in the cloud</td>
<td>H2020</td>
<td>Unified framework where resulting primitives are integrated, while following the end-to-end security principle as closely as allowed by functional and non-functional requirements.</td>
<td>tredisec.eu</td>
</tr>
<tr>
<td>WISER</td>
<td>Wide impact cyber security risk framework</td>
<td>H2020</td>
<td>Place cyber risk management at the heart of good business practices, benefiting multiple stakeholders through the provision of a cyber risk management framework able to assess, monitor and mitigate risks in real-time, in multiple industries.</td>
<td>wiser.eu</td>
</tr>
</tbody>
</table>
Data Intelligence
Helping to manage data by researching on Big Data, AI, Semantics and Linked Data

Description

Artificial Intelligence and Big Data are probably the most important technologies related to the digital transformation quest. AI, powered by the massive amounts of data that we have at our disposal today, will be anywhere: In our mobile phones, in our homes, in the cities, in our daily work. It is a technology that will change radically our way of living, which poses not only technical, but societal and legal issues.

The D.I. Lab is researching in AI and data-related subjects to understand how different stakeholders’ businesses and governments, citizens and patients, industries and cities can benefit of these promising technologies.

Goals

The main objective of our research is to apply the technology to real scenarios where the innovation on AI and Big Data can be of interest for our customers and the society.

• Artificial Intelligence: From Machine Learning to Deep Learning to the multiple applications of the technology to real world applications and challenges.
• Big Data: We have a strong background in almost all aspects of the Data Value Chain as well as data architectures.
• Semantics: Proven track record on the application of Cognitive Computing and Knowledge Graphs in collaboration with AI and Big Data.
• Linked Data: Application of the Linked Data paradigm for data publication and sharing.

Main activities

We believe there is no solution that fits all, but general good architectural principles and best practices combined with an excellent knowledge of available tools and new research trends, make the difference between success and mediocrity.

• We develop AI solutions based on machine learning and deep learning in the scope of data analytics projects.
• We develop AI solutions based on machine learning and deep learning in the scope of data analytics projects.
• Of particular interest for us are the architectures, frameworks and techniques that are the foundations of any data-intensive related applications.
• We have developed a Social Network monitoring tool called CaptuNet that is the cornerstone of our knowledge transfer to commercial research and innovation results.
• We have an extensive track record in projects and solutions dealing with Semantic Technologies, Cognitive Computing, Knowledge Graphs and NLP.

Challenges

• Artificial Intelligence
  • Understanding the best ML algorithms for different tasks and in different computing platforms.
  • Usage of Deep Neural Networks in different application fields.
  • Data bias and responsible AI.
• Big Data
  • Understanding how and when to use big data in combination with HPC, Cloud and Edge Computing.
  • Architectural approaches to deal with massive amounts of historical and streaming data in a coherent manner.
• Semantic Technologies
  • Knowledge Graphs and their application to AI.
  • Formal semantics in the Data Value Chain.
  • Linked Data and Open Data.

Current Research Topics and Findings

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<tr>
<td>ACANTO</td>
<td>A cyberphysical social network using robot friends</td>
<td>H2020</td>
<td>Using robots to increase the number of older adults who engage in a regular and sustained physical activity</td>
<td>ict-acanto.eu</td>
</tr>
<tr>
<td>CoE2IS</td>
<td>Centre of excellence for global systems science</td>
<td>H2020</td>
<td>Advanced decision support in the face of global challenges. It brings together the power of HPC and some of the most promising thinking on global systems in order to improve decisions in business, politics and civil society.</td>
<td>crowds-project.eu</td>
</tr>
<tr>
<td>CrowdHealth</td>
<td>Collective wisdom driving public health policies</td>
<td>H2020</td>
<td>Integration of high volumes of health-related heterogeneous data from multiple sources with the aim of supporting policy making decisions.</td>
<td>crowdhealth.eu</td>
</tr>
<tr>
<td>PHEME</td>
<td>Computing variability across media, languages, and social networks</td>
<td>FP7</td>
<td>Combination of big data analytics with advanced linguistic and visual methods. The results will be suitable for direct application in medical information systems and digital journalism.</td>
<td>pheme.eu</td>
</tr>
<tr>
<td>CrowD</td>
<td>Making transport smarter, leveraging the human factor</td>
<td>H2020</td>
<td>Methods to perform cross-sectoral streaming Big Data integration including geographic, transport, meteorological, cross domain and news data, while capitalizing on human feedback channels.</td>
<td>crowd-project.eu</td>
</tr>
<tr>
<td>TOREADOR</td>
<td>Trustworthy model-aware analytics data platform</td>
<td>H2020</td>
<td>Aims at overcoming some major hurdles that until now have prevented many European companies from reaping the full benefits of Big Data Analytics.</td>
<td>toreador-project.eu</td>
</tr>
</tbody>
</table>
## Identity & Privacy

### Securing corporate & personal identity in cyberspace

#### Description

Secure identity and privacy technologies are key enablers for citizens to interact safely in our Digital Society and for businesses addressing Digital Transformation / Industry 4.0. They allow to efficiently protect who and what we are, addressing all aspects of life involving ICT and online services: fundamental human rights and freedoms including the right to personal data protection.

Both the assurance of identity data security and advanced privacy protection create key competitive advantage for Atos and for our public and private partners, having in focus both enduser and customer concerns in this regard and the existing threats which create social alarm and hamper trust in eServices of global digital market and customer concerns in this regard and the existing threats which create social alarm and hamper trust in eServices of global digital market and ICT systems in general.

Our vision is all encompassing and considers the role of identity and privacy in the context of the latest areas of technological innovation in close interaction with other ARD teams.

### Goals

- Provide, through secure identity schemes for interoperable identity and Access Management and the protection of identity-related (in compliance with regulatory frameworks such as the GDPR or eIDAS), the basic enablers of trust and security that all stakeholders in the eServices value chains, need.
- Focus on innovative technological trends in all areas to serve the needs of the RH sectors offering trustworthyness solutions and assets and fostering competitive advantages in an increasingly complex and distributed environment.
- Provide advanced and customized eID privacy solutions, that can achieve for Atos customers compliance with regulatory requirements, more efficiency, competitive advantage, reduced fraud and enhanced trust and cooperation with public and private stakeholders.

### Main activities

- Electronic Identity Management Technologies
- Digital/Electronic Identity Technologies
- Cryptography and Electronic Trust Services
- Identity and Access Management
- Data Protection by Design and Privacy Engineering Methodologies
- Border Control & Biometrics

### Challenges

- Interoperable eID and managed IAM solutions will be key enablers of secure and seamless access to eServices (e.g. CEF eID and eIDAS).
- eID & eIDM trust services, advanced cryptography and privacy/security-by-design as fundamental enablers of Trust in Future Internet & Cloud.
- Complex Identity Federation & Data Exchange Scenarios, including scenarios involving big data, cloud computing and/or IoT.
- Simultaneously strong (multi-factor) and user-friendly authentication.
- Identity & Privacy Assurance.
- Auditing and Compliance.

### Current Research Topics and Findings

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</thead>
<tbody>
<tr>
<td>ABCAEU</td>
<td>Automated border control gates for Europe</td>
<td>H2020</td>
<td>Makes border control more flexible by enhancing the workflow and harmonizing the functionalities of Automated Border Control (ABC) gates and other Border Control Processes, aligned with Smart Borders Package of the EU</td>
<td>abc-aeu.eu</td>
</tr>
<tr>
<td>ARIES</td>
<td>Reliable European identity ecosystem</td>
<td>H2020</td>
<td>Comprehensive framework and holistic approach of technologies, processes and security features for reliable identity ecosystem to improve identity trust and security</td>
<td>aries-project.eu</td>
</tr>
<tr>
<td>CREDENTIAL</td>
<td>Secure cloud identity wallet</td>
<td>H2020</td>
<td>Innovative cloud based services for storing, managing and sharing digital identity information and other personal data, it relies on combination of strong hardware-based multi-factor authentication with end-to-end encryption</td>
<td>credential.eu</td>
</tr>
<tr>
<td>DAPHNE</td>
<td>Data-as-a-Service platform for healthy lifestyle and preventive medicine</td>
<td>FP7</td>
<td>Development of a platform to deliver personalized guidance for lifestyle management to the citizen/patient</td>
<td>daphne-feu.eu</td>
</tr>
<tr>
<td>FIDES</td>
<td>Federated identity management system - Phase II</td>
<td>EIT DIGITAL</td>
<td>Platform with secure cross platform identity management system (modelbased), consolidation into a production environment in three national contexts with a sustainable business model</td>
<td>fides-project.eu</td>
</tr>
<tr>
<td>FOODIE</td>
<td>Farm oriented open data in Europe</td>
<td>CIP</td>
<td>Open and interoperable agricultural specialized platform hub on the cloud for the management of data relevant for farming production</td>
<td>foodie-project.eu</td>
</tr>
<tr>
<td>LEPS</td>
<td>Leveraging eID in the Private Sector</td>
<td>Connecting Europe Facility (CEF)</td>
<td>Enables private sector electronic services providers to connect to the Pan-European eIDAS infrastructure for cross border electronic identification and authentication</td>
<td>leps-project.eu</td>
</tr>
<tr>
<td>LIGHTest</td>
<td>Lightweight infrastructure for global heterogeneous trust management in support of an open ecosystem of stakeholders and trust schemes</td>
<td>H2020</td>
<td>Global cross domain trust infrastructure that renders it transparent and easy for verifiers to evaluate electronic transactions and make domain-specific trust decisions.</td>
<td>lightest.eu</td>
</tr>
<tr>
<td>MOSiUS</td>
<td>ICT cloud-based platform and mobility services available, universal and safe for all users</td>
<td>FP7</td>
<td>Changing European users’ mobility habits by offering in-vehicle and personalized travel information management services that support the best transport choice and provide feedback on energy efficiency savings.</td>
<td>mosius-project.eu</td>
</tr>
<tr>
<td>PRIME</td>
<td>Personal information management ecosystems</td>
<td>EIT DIGITAL</td>
<td>Modular, scalable privacy tool offering patients a dashboard that shows which caregivers have accessed their data and when. Security features include strong multi-platform authentication, authorization and audit.</td>
<td>prime-baking.eu</td>
</tr>
<tr>
<td>PRISMA</td>
<td>CLOUD</td>
<td>Privacy and security monitoring services in the cloud</td>
<td>H2020</td>
<td>Enable end to end security for cloud users and provide tools to protect their privacy with the best technical means possible - by cryptograph</td>
</tr>
<tr>
<td>STRATEGIC</td>
<td>Orchestrate next generation e-government services</td>
<td>CIP</td>
<td>A cloud enabled framework on various infrastructures with a set of services related to public bodies, opening new horizons in the secure and private migration, adaptation, governance and development of public cloud services.</td>
<td><a href="http://www.strategic-project.eu">www.strategic-project.eu</a></td>
</tr>
<tr>
<td>WITDOM</td>
<td>Empowering privacy and security information trusted environments</td>
<td>H2020</td>
<td>Automatic and efficient privacy provisioning solutions, keeping data confidential in the untrusted environment, while the data owner can operate with and make use of the data in the encrypted domain.</td>
<td>wittom.eu</td>
</tr>
</tbody>
</table>
Internet of Everything

Making life easier from a complex IoE world

Description

In recent years the potential Internet of Things technologies have acquired high attention and gained further recognition as key enablers for citizen-centric business generation in different application areas, such as Smart Cities, Smart Energy and Environmental Management and Protection, Smart Industry and Factories of the Future, Smart Home and Assisted Living, Public Safety, Agriculture and Tourism. The Internet of Everything concept goes one step forward involving People, Process, Data and Things under the same scope.

We currently understand the Internet of Everything as a paradigm considering the pervasive presence, in any context of the human activity, of sensing and actuating physical devices and ICT objects that are addressable, interconnected, and able to communicate and cooperate which each other.

Also, a clear IoT end to end strategy aligned with the Group strategy from IoT Services to IoT platform IoT will enable and empower our clients on their digital transformation journey and develop competitive advantage. The new IoT paradigm is not only about gathering data from ICT objects that are addressable, interconnected, and able to communicate and cooperate which each other.

We strongly support the usage of standard and open web technologies to construct the Internet of Everything. The openness in technologies provides a full operative IoE platform capable of connecting People, Process, Data and Things in a standard, scalable and decoupled way. The resulting ecosystem enables multiple domain business and applications through a set of services for real-time communications, data storing, monitoring, statistics, etc.

We participate in technological research activities looking both for deriving user situation-aware application requirements in real-time and for producing virtualized IoT object models and integration frameworks equipped with advanced features. Virtual IoT objects become robust and reusable in a broader IoT service context, as well as interoperable and adaptable behavior. They act and react intelligently thanks to the analysis of surrounding data and communicate to the world through a set of services for real-time communications, data storing, monitoring, statistics, etc.

Main activities

At technical level we focus on developing a complete IoT platform where the embedded devices are complemented with the new binding of tiny computers and any kind of sensors. Smart gateways virtuallises sensors (devices, actuators, etc.) powering them with connectivity capabilities and adaptable behavior. They act and react intelligently thanks to the analysis of surrounding data and communicate to the world through different services and integration frameworks.

We participate in technological research activities looking both for deriving user situation-aware application requirements in real-time and for producing virtualized IoT object models and integration frameworks equipped with advanced features. Virtual IoT objects become robust and reusable in a broader IoT service context, as well as interoperable and adaptable behavior. They act and react intelligently thanks to the analysis of surrounding data and communicate to the world through different services and integration frameworks.

At the business modeling research level, our aim is to abstract technological heterogeneity of vast amounts of diverse real-world addressable objects, to enable their use for enhancing IoT services and applications, and the involvement of cross-domain activities in multi-sided business platforms. Initiatives, results and trends in synergy with research domains like cloud computing, big data and social networking are also carefully followed to shape and drive our research and development roadmaps.

Goals

• Provide a full operative IoE platform capable of connecting People, Process, Data and Things in a standard, scalable and decoupled way. The resulting ecosystem enables multiple domain business and applications through a set of services for real-time communications, data storing, monitoring, statistics, etc.

• Foster Open Standard Web technologies to create services, platforms and applications focusing on the growing needs of interoperability. IoT open standards interoperability is necessary for market adoption and horizontal solutions.

• To support interoperability and Open Standards, the European FIWARE Platform is used to implement IoT scenarios, taking advantage of the IoT Generic Enablers and NGSI Data Standard.

• Development of sustainable business models, embracing the full potential of the Internet of Everything.

• Participate in R&D programs to propose innovative security environments.

As a key actor in the European IoT research landscape, our lab provides technological contributions to the solution of the mentioned issues aiming at ensuring wider adoption and implementation of the IoT paradigm.

Challenges

Some of the pending achievements towards a mature implementation of the IoT paradigm are:

• Faster software developments and solutions using a complete ecosystem guided by common open standard technologies and architectures.

• The business of Open Standard APIs implementing and exposing services and tools through APIs as a product. RESTful interfaces support this approach making use of HTTP protocol as standard for M2M, M2A, V2V, etc.

• Semantic interoperability of sensor information exchange models in heterogeneous environments.

• Adoption of governance mechanisms fostering innovation trust, and fair data ownership, management, while respecting security, privacy and complexity of new IoT environments.

• Bringing agile developments and “continuous integration” methodologies to provide deployment of large-scale environments.

Table of Title Project Title Funding Description

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<tr>
<td>AGILE</td>
<td>Adaptive Gateways for Diverse Multiple Environments</td>
<td>H2020</td>
<td>Modular hardware and software gateway for IoT with support for protocol interoperability, device and data management, IoT apps execution and external Cloud communication.</td>
</tr>
<tr>
<td>CREATEIoT</td>
<td>CREATEIoT</td>
<td>H2020</td>
<td>Stimulating collaboration between Internet of Things initiatives, foster the take up of IoT in Europe and support the development and growth of IoT ecosystems based on open technologies and platforms.</td>
</tr>
<tr>
<td>ESSENCE</td>
<td>Empowering Safer homes for Senior through Connected Technologies</td>
<td>ETIDIGITAL</td>
<td>Solution for smart living and inclusion that can assist elderly people, predict danger and react to minimize risk in these situations.</td>
</tr>
<tr>
<td>iKaaS</td>
<td>Intelligent Knowledge-as-a-Ser vice</td>
<td>H2020</td>
<td>Intelligent, privacy preserving and secure Smart City Platform based on a Big Data resource and an analytics engine.</td>
</tr>
<tr>
<td>VICTONY</td>
<td>Open virtual neighbourhood network to connect IoT infrastructures and smart objects</td>
<td>H2020</td>
<td>Development and demonstration of a bottom-up ecosystem of decentralised interoperability of IoT infrastructures called virtual neighborhood, where users can share the access to their smart objects without losing the control over them.</td>
</tr>
</tbody>
</table>

José Gato
Head of Lab
Next Generation Cloud
Contributing to Atos innovation strategy with regards to Cloud and Edge computing

Description

Computing is becoming increasingly pervasive in all aspects of our live, as “connected things” become more “intelligent things” bringing the need of fully networked computing systems capable of delivering advanced behaviours and interacting with their surroundings. Soon sensors, robots, drones, routers, servers and cars will only be seen as particular forms of infrastructure elements. This way, computing will no longer be constrained to specific devices but will be virtually embodied and pervasive to everything, enabling an unprecedented computing continuum.

Cloud computing initially emerged in the space in which we transitioned from an era in which underlying computing resources were both scarce and expensive to an era in which the same resources started to be cheap and abundant, enabling the democratization of computing and providing the illusion of infinite computing. Today we are observing new forms of Cloud Computing such as Edge and Fog, starting to break the Data Centre barriers so to provide novel forms of computing embracing power and data resources increasingly available everywhere. The new forms of Cloud are making the Cloud concept evolve a more distributed approach in order to lead to better performance and enabling wider diversity of application and services, complementarily to existing multi-cloud and hybrid cloud models.

Goals

Gains in complexity of the connected “intelligent things” will pose specific requirements to Cloud Computing evolution. The self-contained and self-sustaining nature of those resources combined with their size and energy harvesting constraints will require of novel computing and communication architectures.

Developing cloud computing technology that is compatible with the management of hardware heterogeneity will call for finding ways to optimally endeavour heterogeneous special purpose processing units without losing the advantages of abstraction in utility based models such as development of sharing schemes and heterogeneous aware scheduling at resource and platform levels.

The advent of fully distributed collaborative Cloud environments is another source of donation in order to fully exploit computational power of “intelligent things”. These environments are initially taking for in the evolution of Arbor Clouds enabling smart collaboration among mobile devices. Further evolution of this concept will enable the creation of dynamic ecosystems meshes or swarms of ‘Intelligent Things’. These will allow the creation of dynamic ecosystems encompassing ‘Intelligent things’, cyber physical devices, edge and clouds, each of these adding to the collective capability and insight under the term Swarm Computing.

The main goal of this lab is to contribute to Atos research and innovation strategy with regards to Cloud, Edge and Swarm computing development models and architectures.

Ana Maria Juan Ferrer
Head of Lab

Main activities

- Advanced capabilities for IaaS, PaaS and SaaS: Accounting and monitoring, Autonomic resource management, SLA management, Multi-cloud environments IaaS, PaaS and SaaS, Experimental Facilities in Cloud and Edge in Clouds and Data Centres
- Service Management and Engineering: Advanced Service Architectures and SaaS, Cloud Service Composition, aggregation and orchestration, SaaS, Application and Data Marketplaces, Trust & Reputation Service Management, and License Management
- Edge computing: Heterogeneous / Things virtualisation management, Arbor Cloud management, Application offloading, Local Cloud Management, Data Management, and Service Orchestration

Challenges

- Cloud Hybrid models: Interoperability, Portability by Federation and Brokerage
- SLAs, Trust, and License Management for Cloud environments
- Integration of edge and mobile devices into decentralized Cloud architectures for IoT services
- Energy efficiency in heterogeneous computing environments, Cloud computing and communication architectures.
- Data centers: Big Data storage and scalability in Big Data processing
- Cloud-based Experimental facilities
- Autonomic and self-healing capabilities for Cloud management
- Cloud Service composition, aggregation and orchestration
- Cloud Marketplaces, Vertical markets, Ad:value services and Applications
- Cloud Standardisation and Compliance
- Scalability based on predictive models and including heterogeneous resources
- Heterogeneous and autonomic resource management

Current Research Topics and Findings

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<td>Adaptive gateways for diverse multiple environments</td>
<td>H2020</td>
<td>Modular hardware and software gateway for IoT with support for protocol interoperability device and data management, apps execution, and external Cloud communication</td>
<td>agile-iot.eu</td>
</tr>
<tr>
<td>BASMATI</td>
<td>Cloud brokerage across borders for mobile users and applications</td>
<td>H2020</td>
<td>Development of an integrated Brokerage Platform targeting federated clouds in order to support dynamic needs of mobile applications and users.</td>
<td>basmati.eu</td>
</tr>
<tr>
<td>CloudSocket</td>
<td>Business and IT-Cloud Align using a Smart Socket</td>
<td>H2020</td>
<td>Introduction of the BPaaS concept thanks to smart-alignment techniques, packaged as ‘IceClouds’ autonomously deployable and including adaptive rules to appropriately react in a multi-cloud environment.</td>
<td>CloudSocket.eu</td>
</tr>
<tr>
<td>DITAS</td>
<td>Data-intensive applications improvement by moving data and computation in hybrid clouding environments</td>
<td>H2020</td>
<td>Propose a framework, composed by an SDR and an execution environment to overcome the barriers that hamper the adoption of Cloud Computing and increase the adoption of Fog computing by exploiting the full potential of these two paradigms.</td>
<td>ditas-project.eu</td>
</tr>
<tr>
<td>INDOM-DataCloud</td>
<td>Integrating distributed data infrastructures in global exploration</td>
<td>H2020</td>
<td>Development of an innovative cloud platform for the scientific community based on open source software and providing access without restrictions to a diversity of e-Infrastructures.</td>
<td>indom-datacloud.eu</td>
</tr>
<tr>
<td>mF2C</td>
<td>Towards an open, secure, de-centralized and coordinated Fog-to-Cloud management ecosystem</td>
<td>H2020</td>
<td>Design an open, secure, decentralized, and multi-stakeholder management framework, with novel programming models, privacy and security, data storage, service creation, brokerage solutions, SLA policies, and resource orchestration methods.</td>
<td>mf2c-project.eu</td>
</tr>
<tr>
<td>RAPID</td>
<td>Heterogeneous secure multi-vel remote acceleration service for power-weighed integrated systems and devices</td>
<td>H2020</td>
<td>Development of an efficient heterogeneous Cloud computing infrastructure, which can be used to seamlessly offload CPU bound and GPU bound tasks of applications running on lower powered as well as more powerful devices over a heterogeneous network.</td>
<td>rapid-project.eu</td>
</tr>
<tr>
<td>symbIoTe</td>
<td>Symbiotic of smart objects across IoT environments</td>
<td>H2020</td>
<td>Fostering a simplified IoT application and service development process over interworking IoT platforms.</td>
<td>symbIoTe.eu</td>
</tr>
<tr>
<td>TANGO</td>
<td>Transparent heterogeneous hardware architecture development for energy gain in operation</td>
<td>H2020</td>
<td>Control of underlaying heterogeneous hardware architecture, configurations and software systems while providing tools to optimize various dimensions of software design and operation.</td>
<td>tango-project.eu</td>
</tr>
</tbody>
</table>
Research Lines
Geospatial Applications

Living in a spatially-enabled world

Description

Relation to current technological trends:

- Cloud computing, Big Data and HPC: Moving existing geospatial solutions in different domains to the cloud and Big Data paradigm in order to accommodate to customers needs in terms of scalability and performance of the solutions.
- Open data for precision farming agriculture.
- Storage and (near) real-time analysis of large amounts of vector based data (e.g. VGI, sensor observations) and satellite imagery using traditional database approaches as well as big data tools.
- Early warning systems on the cloud for increased performance and interconnection in Crisis Management.
- HPC for real-time execution of complex calculations and scientific models (e.g. tsunami simulations).
- Internet of Things (IoT) and Smart Cities.
- Location awareness is a core component of the Internet of Things.
- Sensor management/data access through OGC SWE standards (Working group in OGC to align SWE with IoT approach).
- Use of GIS open-source technologies.
- Web Map Clients, Leaf, OpenLayers, GeoJSON.
- GIS Web Services (invoking visualization, download and processing geospatial capabilities) Geoservice Mapper.
- Processing libraries: Python (Pandas, SciPy, PySpark, NumPy), Java (GeoTools), Scala (Sbt), Go (Geonode).
- Databases: PostGIS, RocksDB, Apache Accumulo, MongoDB.

Critical Mass / Market

- Expertise in GIS technologies and standards which have been applied in different projects/domains (e.g. OGC, INSPIRE, GEODIS, ORCHES-TRADE).
- Expertise in the Environmental and Crisis Management domains.
- Strong partners network in the GIS community.
- Experience in integration of sensor data.
- Shifting to big data/cloud paradigm (experience being gained in FOODIE, DataBio, CLARITY, EUKAT projects).

Relation with Atos Portfolio

- Solutions/Projects are clearly aligned with Atos business areas and can provide support for bidding opportunities.
- Environment and Agriculture (e.g. Spanish Ministry of Environment and Agriculture) with FOODIE, ENVOI, DataBio and EUKAT projects.
- Development of Climate Service solutions in support of decision makers and infrastructural and transport planners.

Software Engineering

Improve your productivity, release better quality software

Description

- Model Driven Software Engineering (Design Time):
  - MDSD/ME towards engineering techniques and methods applied to the specification, program comprehension, re-engineering (lifecycle driven) of software systems and code synthesis.
- Software modeling and simulation (Runtime):
  - Research on techniques and methods that enable the specification and modeling of concerns on complex software systems and their simulation at model level exploring the solution space.
  - Aspect Oriented Software Engineering (Modeling):
    - AOP/ADM techniques applied to the management of cross-cutting concerns, interweaving in complex software systems.
  - Internet of Things (IoT) and Smart Cities.
  - Location awareness is a core component of the Internet of Things.
  - Sensor management/data access through OGC SWE standards (Working group in OGC to align SWE with IoT approach).
  - Use of GIS open-source technologies.
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  - Databases: PostGIS, RocksDB, Apache Accumulo, MongoDB.

Critical Mass / Market

- Several years of expertise in software engineering technologies and standards which have been applied in different projects/domains, including:
  - FP6: SECSI, MOMICS
  - FP7: NEXOF-RA, SOA4ALL, Qualisco, Cloud4SOA, MARINOS, ARTET
  - H2020: SUPERSEDE, MegaM@RTZ, STAMP, ELASTEST
- Main Assets:
  - yourBPM framework for dynamic service composition.
  - ARTIST model-based framework supporting the re-architecture of legacy systems.
  - SUPERSEDE: Runtime Dynamic Adaptation Enactment (DAPPELE)
  - STAMP: Amplification Tooling (Unit Test, Configuration Test, Runtime Test).
  - ELASTEST Platform.

Jesús Gorroñogoitia

Miguel Ángel Esbri
In recent years, the majority of the world’s Critical Infrastructures (CIs) evolved to become more flexible, cost-efficient, and able to offer better services and conditions for business opportunities. Towards this evolution, CIs and companies offering CI services had to adopt many of the recent advances of the Information and Communication Technologies (ICT) field. This adaptation, however, was rather hasty and without thorough evaluation of its impact on security. The result was to leave CIs vulnerable to a new set of threats and attacks that impose high levels of risk to the public safety, economy, and welfare of the population.

In so far, the main approach to protect CIs is to handle them as comprehensive entities and offer them a complete solution for their overall infrastructures and systems (IT&OT departments). However, complete CI protection solutions exist in the form of products from individual companies.

Challenges

Value Proposition

The main aim of CIPSEC is to create a unified security framework that orchestrates state-of-the-art heterogeneous security products to offer high levels of protection in IT (Information technology) and OT (Operational technology) departments of CIs. As part of this framework, CIPSEC will offer a complete security ecosystem of additional services that can support the proposed technical solutions to work reliably and at professional quality. These services include vulnerability tests and recommendations, key personnel training courses, public-private partnerships, forensics analysis, standardization, and protection against cascading effects.

All solutions and services will be validated in three pilots performed in three different CI environments (transportation, health, environment). CIPSEC will also develop a marketing strategy for optimal positioning of its solutions in the CI security market.

Business Impact

- CIPSEC will provide a unified security framework for Critical Infrastructures by allowing easy integration of heterogeneous systems into its framework with reduced adjustment, notably anomaly detection, anti-malware, cyber-security detection and prevention, distributed denial of service, and hardware security platforms. CIPSEC will collect and process input from multiple sources and will provide monitoring for the complete Critical Infrastructure.
- CIPSEC will offer a complete set of additional services to reliably support the proposed technical solutions at a professional demanding level, among which industrial control system vulnerability tests, studies for cascade effect attacks, contingency plans, and innovative forensics analyses are included. Training courses and certification will also be provided.
- Through the identification of a requirements baseline for security and resilience within pilots, CIPSEC will be endorsed under true conditions and real infrastructures. CIPSEC will supply an overall solution, suitable for transportation, health, and environment sectors both at module level (for each industry and security facet) and at system level (the complete framework).

CIPSEC

Strategic Projects

Challenges

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In so far, the main approach to protect CIs is to handle them as comprehensive entities and offer them a complete solution for their overall infrastructures and systems (IT&OT departments). However, complete CI protection solutions exist in the form of products from individual companies.
Current applications are eager to acquire and consume more and more amounts of data coming from distributed heterogeneous devices and sources, specially from IoT and mobile applications. For a developer there is a need to deal with data in an effective, fast, agile, and secure manner. This truth is that edge nodes, only in combination with cloud services, can provide the benefits of both worlds: better bandwidth, latency and security, and reliability and scalability levels required by such Data-Intensive Applications (DIAs).

V alue Proposition

1. Improvement of productivity when developing and deploying data-intensive applications.
2. Enhancing the data management in mixed cloud/edge environments adding data and computation movement.
3. Definition of strategies for improving the execution of data intensive applications.
4. Enabling the execution of data-intensive applications in a mixed cloud/edge environment.
5. Maximizing the impact on the market of developers and adopters of data-intensive applications.

Business Impact

The goal of DITAS is to propose a framework, composed by a SDK and an execution environment, which aims to overcome the barriers that now hamper the adoption of Cloud Computing and increase the adoption of Fog computing by exploiting the full potential of these two paradigms in a synergic way. This will support the development and execution of data-intensive applications that are new and even more in the future – crucial for organizations and companies that want to manage their data in an efficient, reliable, scalable and secure manner. Abstractions provided in DITAS with Data Virtualization and Data Utility will expose the data to be managed by the application in terms of Virtual Data Container which hide the complexity of the underlying infrastructure composed of heterogeneous data sources, smart devices, traditional servers, and sensor networks. Atos is the Project Coordinator and actively involved in the Scientific and Technical Coordination due to its extensive experience managing large projects. Atos also contributes actively to almost all the technical activities. Additionally, Atos leads the market analysis, exploitation planning, the IPR management, and is Impact and Dissemination leader.

Challenges

EO4wildlife main objective is to bring large communities of multidisciplinary research scientists such as biologists, ecologists and ornithologists around the world to collaborate closely together while using the European Sentinel Copernicus Earth Observation more extensively and efficiently. EO4wildlife research specialists in the big data intelligent management, processing and advanced analytics with a Knowledge Base for wildlife migratory behavior trends. The research will lead to the development of web-enabled services using OGC standards for sensor observation and measurements and data processing of heterogeneous geospatial observation data and uncertainties.

Value Proposition

Scientists are able to use Copernicus datasets for different purposes with the objective of identifying the key environmental factors that play a major role in the distributions of animals through the world. Additionally, predictive models definitively can help with the goal of providing tools for better decision making about animal protection. But none of those can be studied separately without taking into account various climate change scenarios to determine population distribution and understand how those changes may affect phenology and demographic processes.

Business Impact

Space technologies have the potential to transform scientific project back on Earth. As a member of the European Commission’s EO4wildlife project, Atos is designing and developing a platform that will enable scientists around the world to analyze wildlife movements using the Sentinel satellites’ observation data of the European Union’s Copernicus program to support projects to study the habitat of various migrating animals. These earth observation satellites are generating unprecedented volumes of data. To maximize the value of these terabytes of information, the scientific and research community needs to be able to integrate this data into their studies.

Contact

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OUTCOMES

DITAS value proposition is based on the following objectives:

1. Improvement of productivity when developing and deploying data-intensive applications.
2. Enhancing the data management in mixed cloud/edge environments adding data and computation movement.
3. Definition of strategies for improving the execution of data intensive applications.
4. Enabling the execution of data-intensive applications in a mixed cloud/edge environment.
5. Maximizing the impact on the market of developers and adopters of data-intensive applications.

Value Proposition

DITAS Cloud Platform allows developers to design data-intensive applications, deploy them on a mixed cloud/edge environment and execute the resulting distributed application in an optimal way by exploiting the data and computation movement strategies, no matter the number of different devices, their type and the heterogeneity of runtime environments. It brings the developer’s toolbox the best of Cloud & Edge worlds.

The platform provides two main tools: DITAS SDK, which supports design and deployment, and DITAS Execution Environment, which is responsible for running and controlling the behavior of the application.

Outcomes

The Application Layer design will be driven by different scenarios, which represent the technical solutions to implement in order to address various problematic issues for the end users of the project. In this sense, the platform will provide seabird distributions predictions, better knowledge of pelagic fish’s migrations routes and habitat use, marine mammal assessment on habitat preferences to inform conservation and management, and support to identify marine turtle behaviors.

Business Impact
Challenges

HeartMan is a personal health system to help congestive heart failure patients manage their disease. Its decision support system provides personalized advice. It features advanced devices and monitoring methods to understand the patient’s physical and psychological state, and standard-based data management for wide interoperability.

16%-2% of people in the developed world suffer from congestive heart failure (CHF), which costs the society around 100 billion USD per year. While the improvements in treatment have lately slightly decreased the number of hospitalizations and deaths due to CHF, they remain high around half the patients with CHF are expected to die within five years, and CHF is the most frequent cause of hospitalization in people aged over 65. There is currently no cure available, which makes better management of CHF of paramount importance: both to improve the patients’ quality of life and to reduce the economic costs to the society.

Value Proposition

In the HeartMan project we developed a personal health system for CHF that features a DSS based on predictive computer models. The user – a CHF patient – is monitored with the sensors in his/her smartphone, health devices that may be wearable (e.g. ECG monitor) used occasionally (e.g. scales) or placed in the apartment (e.g. temperature and humidity sensor). The devices are connected to a mobile phone through a framework capable of intelligently managing a wide range of devices and ensuring the right devices are sampled with the right frequency at the right time. The framework also interprets the sensor data to extract parameters describing the patient’s physical and psychological state. These parameters together with the user’s feedback entered through a mobile application are fed into a DSS.

The DSS first uses predictive computer models for CHF and other decision models to suggest the appropriate intervention for the patient in his/her current state. Next, the patient’s psychological profile and state is used to select the most appropriate presentation of the intervention as well as select psychological interventions aiming to increase the receptiveness to medical advice and help cope with the disease. The interventions are finally presented to the user through the mobile application. The data generated by the system is stored in the cloud, taking into account privacy and security concerns. It is available to the treating physician through a web interface, and hosts are also able to modify the advice provided by the DSS if necessary. Anonymized data is available to medical researchers, who can be able to gain new insights into the CHF and its management.

Business Impact

The HeartMan system achieves improved self-management of CHF by using a DSS based on predictive models, intended for the patients. The HeartMan DSS is designed as a patient-oriented system, promoting self-care management in an individualized fashion. The patients are educated and assisted in the monitoring procedures required by the system and provided with personalized advice together with explanations appropriate for their understanding. As a result, they can be more involved in their disease management.

The available evidence, these features are expected to increase the level of patient participation.

The HeartMan system is a major step forward in the technology for self-management of CHF. It provides considerably more value to the patients than the current devices only that monitor the patients’ physiological signals and at best provide basic interpretations.

The HeartMan system provides decision support through cognitive behavioral therapy using an approach based on cognitive dissonance and mindfulness exercises. From the available evidence, these features are expected to enhance the level of patient empowerment and self-control.

Challenges

The InteGRIDy project aims at integrating cutting-edge technologies, solutions and mechanisms in a scalable Cross-Functional Platform of replicable solutions. This platform connects existing energy networks to diverse stakeholders, with enhanced observability of both generation and consumption profiles, facilitating the optimal and dynamic operation of the Distribution Grid, fostering the stability of the electricity grid and coordination of distributed energy resources. The HeartMan system is a major step forward in the technology for self-management of CHF: it provides considerably more value to the patients than the current devices only that monitor the patients’ physiological signals and at best provide basic interpretations.

The HeartMan system provides decision support through cognitive behavioral therapy using an approach based on cognitive dissonance and mindfulness exercises. From the available evidence, these features are expected to enhance the level of patient empowerment and self-control.

Value Proposition

• Integration of existing smart metering/automation systems with IoT infrastructure enabling interoperability through standard APIs and efficient data collection and monitoring of grid assets.
• Novel modeling and profiling mechanisms allowing the creation of network topology and demand response models, together with battery cycling and charging profiles.
• Predictive algorithms enabling dynamic scenario-based simulation and multilevel forecasting for managing real-time demand and supply of energy and optimized demand making.
• Powerful and efficient visual analytics and enduser applications using novel human machine interaction techniques.
• A security-aware control framework, built upon the standardization regulatory environment for privacy and data protection.
• Innovative business models providing important tools to the energy market for dynamically involving Demand Response strategies and allowing new energy market entrants.

Outcomes

The overarching methodology of the project seeks to integrate tools, methods and technologies from computer science and electrical engineering with control engineering automation and control of distributed storage systems and chemical engineering assessment of optimum behavior and cycling of batteries, heat storage and hydrogen-enabled systems. Such an interdisciplinary approach to addressing smart distribution grid grid storage and system integration technologies with increasing share of RES is innovative and groundbreaking.

It will follow a pilot-driven approach as its overall goal concentrates on the fulfillment of actual need and requirements. A set of innovative methods/mechanisms integration will be targeted by InteGRIDy activities that will result in exploitable products with a high commercialization potential.

Business Impact

The project will release an integrated platform of the enhanced version of already existing tools together with proper models and methodologies for smart cooperation between energy users and the Grid. These results will significantly contribute to the market of services that a new generation of energy users will be able to provide to the operators of the energy distribution networks.

The technological solutions the project will bring into the market will enable win-win cooperation among energy stakeholders in the frame of a continuously evolving regulatory framework that, even though with different speeds in different countries, is currently open new internal markets of energy and energy-related services.

These technological innovations introduced in this project will allow the involved SMEs to act as enablers for the application of innovative demand response schemes, ensuring the smooth and acceptable introduction of demand as a high-value actor in the energy markets.
In February 2013, the European Commission published a survey on ICT use in Education* that revealed several key findings, which shaped the European view on the use of computing devices for learning. One of the key findings is the need for such solutions to enter learning environments in a more interactive way, not only in the lessons’ preparation phase but by the tutor as is the most common use nowadays, but also the need to have a more general ICT use that serves the educational process outside a dedicated learning venue (classroom, enterprise, etc.) as well. Moreover, in the special cases of intellectually disabled children, the use of ICT has been extensively tested during the last decades and has now reached a level of maturity where targeted solutions can be applied, going beyond the sphere of research and thus, creating a new potential market.

MaTHiSiS will assist the educational process for learners and their tutors and caregivers by creating a novel and continuously adaptable。“robot-machine-computer” Human interaction ecosystem to enhance vocational training, workplace learning and mainstream education for individuals with or without learning disabilities.

Business Impact

It will support learning across a variety of learning contexts and, with the use of a variety of devices (robots, interactive boards and mobile devices) with personalized and adaptable, time and location independent learning paths, being transferred between the agents, always taking into consideration best knowledge and practices learnt from the previous devices.

By the end of the project, it will introduce a marketable innovation, aimed at the re-usability of educational and training content and fostering the interactivity between technology and learner/tutors/caregivers.

Value Proposition

Outcomes

One of the core objectives of the project is to enter the learning environments and make use of computing devices in learning in a more interactive way, which will provide a product system to be used as formal, informal and familiar education. An ecosystem for assisting learners/tutors/caregivers for both regular learners and learners with special needs will be introduced and validated in 5 use cases: Autism Spectrum Case, Profound and Multiple Learning Disabilities Case, Mainstream Education Case, Industrial Training Case and Care Guidance Distance Learning Case.

MaTHiSiS product system consists of an integrated platform along with a set of reusable learning components (educational material, digital educational artifacts, etc.) which will respond to the needs of a future educational framework, and provide capabilities for (i) adaptive learning, (ii) automatic feedback, (iii) automatic assessment of learner’s progress and behavioral state, (iv) affective learning and (v) game-based learning.

Within MaTHiSiS, an innovative structural tool of learning graphs is going to be introduced to guide the learner through the process of learning in the given scenario. To reach a learning objective, the learner will have to “follow the path” of the learning graphs built up on Smart Learning Atoms, which are certain learning elements that carry defined learning materials.

To ensure barrier free integration in the learning environment, MaTHiSiS will make use of a range of interactive devices, such as specialized robots, mobile devices and whiteboards. The consortium will ensure easy-to-use solution with a specialized graphical editor like tool, allowing to easily create educational materials as well as the reusability within both mainstream education and vocational training setups.

For the purpose of valuating MaTHiSiS approach in learning environment, a set of Smart Learning Atoms (SLA) is going to be created for defined use cases. Such SLA will adapt to each learner in a different way based on their particular needs, cognitive effective state, relevance to specific learning requirements and previous performance. Further, an editor like tool will be introduced to be able to transform educational material into SLAs. The learning graphs then are going to be deployed to interact with the CLS as well as a front-end tool for tutors and caregivers to enable creating, editing and authoring of the learning material.

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Outcomes

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A cloud-based Learner’s Space (CLS) will be developed to provide storage and interaction system for adaptation/personalization in learning, profiles, storage, interaction, data acquisition and analysis as well as content creation on the fly. This is a core component of the MaTHiSiS system which include 4 crucial subsystems that create an innovative smart learning ecosystem: (i) the experience engine, a graph-based interactive storytelling engine, that generates interactive content that is later sent to a device of tutor/social learner’s choice; (ii) the learning graph engine, responsible for adaptation of the Learning Graph based on learner’s behavior and interactions; (iii) the Decision Support System (DSS) providing and collecting learning analytics and controlling synchronous and asynchronous interaction between devices, and (iv) Profile Repository to store collected data and learning graphs for learners/profile.

To ensure constant educational flow and augmented learner engagement, the emotion recognition and context aware cognitive/behavioral status extraction tools are going to be introduced within the system addressed by the Sensus component.

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Value Proposition

Outcomes

More than 90% of manufacturing companies in Europe are SMEs. When trying to adopt Industry 4.0 paradigm, there is a big challenge for SMEs to access new technologies, to acquire the right skills and to transfer their products to the market.

MIDIH aims at producing a one-stop shop for manufacturing SMEs to provide them technological and business skills building services.

The main outcomes of the project will be:

• The MIDIH ecosystem of Competence Centers and DIHs: The MIDIH ecosystem is composed by the three existing pan EU DIHs.
• The MIDIH Collaboration Platform for panEU and Regional DIHs: A DIH is a network of Competence Centers behaving as a one-stop shop for SMEs to access technology, knowledge and market.

Business Impact

The main impact of the project is to provide the network of DIHs and CCs with new technological and business services in areas not previously covered as real as security and privacy, also from a legal-policy viewpoint. We have identified an Automotive Industrial case in Italy, a Cutting Tools Industrial case in Spain and a Collaborative Manufacturing and Logistics Industrial case in Germany.

An SME-oriented Access to Market sustain able program to overcome the current barriers preventing startups and SMEs to directly address the Manufacturing Industry market.

MaTHiSiS

Coordinator

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MaTHiSiS

Budget

762086 €

Funding

659895 €

Web

www.mathsis-project.eu

Value Proposition

Outcomes

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An SME-oriented Access to Market sustainable program to overcome the current barriers preventing startups and SMEs to directly address the Manufacturing Industry market.

MIDIH

Coordinator

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MIDIH

Budget

85489250 €

Funding

79915790 €

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Challenges

Social media poses three major computational challenges, dubbed by Gartner the 3Vs of big data: volume, velocity and variety. Content analytics methods have faced additional difficulties, arising from the short, noisy, and strongly contextualized nature of social media: in order to address the 3Vs of social media, new language technologies have emerged, e.g. using socially-sensitive hashing to detect breaking news stories from media streams (volume); predicting stock market movements from microblog sentiment (velocity); and recommending blogs and news articles based on user content (variety).

PHHEME focused on a fourth crucial, but hitherto largely unstudied, challenge: veracity. It has modeled, identified and verified phemes (internet facts), a priori large-scale world knowledge (e.g. w3id Open Data) and a posteriori knowledge and context from social networks, cross-media evidences and spatio-temporal metadata. Key novel contributions are dealing with multiple truths, reasoning about rumor and the temporal validity of facts, and building long-tail models of users, influence, and trust.

Value Proposition

PHHEME achieved this by developing novel cross-disciplinary social semantic methods, combining content semantics, a priori large-scale world knowledge (e.g. w3id Open Data) and a posteriori knowledge and context from social networks, cross-media evidences and spatio-temporal metadata. Key novel contributions are dealing with multiple truths, reasoning about rumor and the temporal validity of facts, and building long-tail models of users, influence, and trust.

Outcomes

In particular, PHHEME delivers a veracity framework able to track rumors over time, providing a set of state-of-the-art components and algorithms for social media veracity and fact checking. Results have been validated in two high-profile case studies: healthcare and digital journalism.

Business Impact

The techniques developed in PHHEME were generic with many business applications, e.g. brand and reputation management, customer relationship management, semantic search and knowledge management. In addition to its high commercial relevance, PHHEME also benefits society and citizens by enabling government organizations to keep track of and react to rumors spreading online. Of especial interest is the potential impact for detection and veracity checking of news for journalists. This has already attracted attention of journalists around the globe, and the proof is that the project is now known by the media informally as the “Twitter lie detector”.

SONATA

Challenges

Software Defined Networking (SDN) and Network Functions Virtualization (NFV) are emerging as major transformational technologies towards “software networks”, a new paradigm that is evolving the telecom sector with new network capabilities and business opportunities.

SONATA addresses the significant challenges associated with both the development and deployment of the complex services envisioned for 5G networks and empowered by these technologies. This project is developing a NFV framework that provides a programming model and development toolchain for virtualized services, fully integrated with a DevOps-enabled service platform and an orchestration system.

Value Proposition

SONATA primary value proposition is to enable and ensure delivery on the promised NFV core business case. The new challenges introduced by the NFV transition require a MANO solution, as well as enablers of service agility on the development side.

Furthermore, SONATA has two unique key advantages that differentiate it from the competition. These two key advantages are the core values of SONATA value proposition:

- **Flexibility and Openness.**
- **Holistic Inter-Organizational Approach with SDK (Software Development Kit) and DevOps**

On the one hand, SONATA’s open and flexible architecture can help to alleviate NFV adopters’ initial pain points revolving around multi-vendor complexity. On the other hand, SONATA’s agile service development and DevOps methodology can help to empower CSPs and supporting third-party developers with the workflow and tools needed for the agile service development and deployment envisioned for 5G networks.

Outcomes

SONATA initial results include:

- **SONATA Network Service SDK:** Facilitates network service development for third-party developers
- **SONATA Service platform:** Thanks to the modular design of its MANO framework, the platform offers high customization options for both Communication Service Providers and Service Developers
- **SONATA NFV DevOps Workflow:** The SONATA system is designed for agile development and operation of network services. It enables a DevOps workflow between the SDK tools and the service platform, which allows developers and operators to closely collaborate.

Business Impact

Reduce time to market of networked services. The contribution towards reducing time to market for services based on NFV adoption and extension is two-fold. On the one hand, offering a well-structured Service Development Kit (SDK) will allow service developers to easily develop and deploy networked services on top of telecom operators’ resources, while, on the other hand, promoting DevOps model to seamlessly integrate service development and management operations of virtual network functions.

Optimize resources and reduce costs of service deployment and operation, developing uniform multi-vendor service orchestration frameworks that fully exploit available resources to efficiently fulfill service requirements. This also extends to non-trivial services, for example, services that maintain state inside their individual functions or that map specific users to specific functions. This is supported both at deployment time for initial configuration of a single service as well as during operation time when the mapping of multiple competing services to resources is re-configured.

Accelerate industry adoption of software networks. Driven by the excellence and complementarity of its consortium, perfectly balanced in terms of company types, technical expertise and roles in the value chain, SONATA achieves this not only by technical results, e.g. the integration of 5G-NAAA SDK with service orchestrator, but also via the definition of a roadmap highlighting business opportunities arising from the adoption of advanced NFV technologies proposed by SONATA.
Challenges

Analyzing the market, we have found the importance of exploiting parallelism is of increasing significance, as parallelization has become a dominant method of delivering higher performance and improved energy efficiency.

In this context, some of the biggest challenges to future application performance are:

- Future application performance lies with not only efficient node-level execution but also power consumption as well.
- Developers need to fully understand, and use an approach that abstracts, the nuances of different hardware configurations and software systems (both rapidly evolving).
- Developers need ways to address additional challenges in performance, security, dependability on target architectures.
- An important step in software design for low power is that software must correctly fit to the capabilities of the underlying heterogeneous hardware.

Value Proposition

- Simplify & Optimize Heterogeneity: Simplifying the way programmers approach the development of next generation applications.
- TANGO tools help control and abstract underlying heterogeneous hardware architectures, configurations and software systems including heterogeneous clusters, chips and programmable logic devices while providing tools to optimize various dimensions of software design and operations energy efficiency, performance, data movement and location, cost, time-criticality, security, dependability on target architectures.

Outcomes

The results will be packaged and released in TANGO Toolbox as Open Source. The toolbox will include:

- A toolbox based implementation of the reference architecture
- Reference software development models and methodologies for best practice
- A collection of reusable IDE plugins, programming models and runtimes
- An adaptive quality model for holistic system performance
- Automatic code generation including software and hardware energy modeling.

Business Impact

TANGO will impact on both the IT industry and the market. It will also impact on the research community advancing future application development processes to a new stage in which the development process for parallel architectures will be simplified, abstracted from underlying architectures and hardware, and will enable tools to consider optimal control and self-adaptation.

Besides the release of the technologies under an Open Source approach, TANGO considers the foundation of a research alliance - TANGO heterogeneous Hardware Alliance (HHW Alliance), in which it will seek complementary efforts of other research projects, initiatives and IT community organizations to nurture a strong research collaboration, integration and effective promotion of the results and continue evolving the work done during the project to become a relevant influence in the developing H/W market.

More concretely, we identify potential in the following contexts:

- Abstracting hardware heterogeneity to help create & operate next-gen apps
- Embracing new hardware in the Data Center extending HPC workloads
- Code taking control of Performance vs Energy Awareness

Challenges

The advent of outsourced and distributed processing environments like cloud prompts fundamental transformations in which ICT ecosystems, while bringing new opportunities to stakeholders in the availability and rational use of physical resources with large-scale savings in IT investments. Conversely, it also poses new security challenges especially for ensuring robust protection of privacy and integrity of personal information, which are a fundamental part of the societal acceptance of next ICT schemes, services and solutions.

In this context, the WITDOM project focuses on developing innovative solutions for truly efficient and practical privacy enhancing techniques and efficient signal and data processing in the encrypted domain for the increasingly demanded outsourced environments. The project pursues to produce a framework for end-to-end protection of data in untrusted and fast evolving ICT based environments, with focus in data sharing scenarios, new threats, vulnerabilities and risks, which require end-to-end security solutions that will withstand progress for the lifetime of applications they support.

Value Proposition

WITDOM aims at producing a novel framework for a quantitative evaluation of end-to-end security and privacy to guarantee an efficient and verifiable provision of privacy in the context of ICT services owned by third party providers, of distributed processing and storage, thereby maximizing independence from static security and privacy commitments by respective providers, and minimizing the current need of blind trust from the clients, solely based on written consents.

This framework shall use security and privacy by design methodologies, and advance the state of the art in effective protection of personal & sensitive data in the following areas:

- Privacy enhancing techniques, perturbation mechanisms and privacy metrics
- Cryptographic privacy techniques supporting encrypted processing
- Cryptographic techniques for integrity and verifiability of outsourced processes
- European legal landscape

Outcomes

WITDOM delivers the following products according to three different levels:

- General Level: The WITDOM framework, aligned with concurrent projects and advancing the SoTA, and the WITDOM E2E framework acknowledges the following aspects:
  - Driven by Privacy by Design principles, holistic, E2E privacy / security time-resistant, efficient solutions are guaranteed.
  - Methods to quantify information leakage to achieve sufficient & adequate privacy levels
  - New trustworthiness enhanced business models for exploitation, leading to reduce the need for trust in third parties.
- Practical Level: WITDOM platform based on a global SoA architecture.
- Implementation Level: Toolkit and prototypes for the project scenarios, aiming at achieving a technology readiness level (TRL) 4-5.
Capturean provides automated methods for knowledge and intelligence processing and management, from data acquisition all the way to the final application services that include decision support, visualization, etc.

This application layer can be developed in a fast and cost-effective way thanks to previous implementations of Capture and the reuse of previously developed services for a broad range of sectors and applications, such as reputational risk in finance, rumor detection, security in smart cities, etc:

Capture is based on state-of-the-art big data technologies. The solution uses Open Source frameworks and tools ranging from Apache Hadoop and Storm for distributed processing, to Apache HBase and Solr for storage and information retrieval. Capture extracts data from SN and RSS feeds using open APIs and tools delivering a set of metrics for specific scenarios.

In the age of Internet, business decisions are increasingly dependent on the just-in-time delivery of relevant information and knowledge. While in the past this information used to be structured, in today’s world there is increasing dependence on unstructured sources of information, such as the Internet, and subjective inputs, such as sentiments, assessments, opinions, rumors, beliefs, etc.

Internet texts such as weblogs, articles and forums provide, for example, a massive amount of potentially useful information. An analyst or decision maker would have to collect, filter, assess, and interpret all these texts with respect to a current object of interest. However, accomplishing this task cannot be done manually due to time constraints in decision making and the enormous amount of documents.

Customers and R&D projects are asking for versatile tools that allow the acquisition of intelligence from Social Networks and apply it to the decision making process. Capture offers a solution open, innovative and adaptable to the needs of customers and organizations to gather and extract facts and intelligence from Social Networks.

This asset is developed by a team led by Tomas Fajardo Lobo.

Research & Innovation 2017
An European open ecosystem to develop smart applications

Do you know how Atos can help you setting smart services based on FIWARE?

Are you looking for opportunities to combine the Internet of Things with information and Big Data services on the Cloud? The FIWARE ecosystem can offer end-to-end solutions, as it provides enabling technologies and an open source standard platform that facilitates the development of smart applications.

Atos, a leading digital services company and one of the founders of the initiative, has acquired deep knowledge of the FIWARE technologies and ecosystem. Atos is therefore a reliable provider of commercial services around FIWARE.

Setting a FIWARE instance

A full FIWARE instance is the first thing our customers ask for when it comes to develop and deploy FIWARE based applications. An instance consists of a replication of FIWARE components and sufficient capacity quote to deploy FIWARE technologies. Based on our experience in operating one of the nodes of the FIWARE Lab - the experimental and federated cloud environment where to test and try FIWARE technologies - and thanks to Atos large expertise in managing dedicated infrastructures for multiple customers providing a professional service on infrastructure operation, we have designed a service that is applicable to customers’ needs.

There are two options:
1. Resources consumed ad hoc, on an hourly/ daily basis.
2. A yearly arrangement, with reduced prices for ad hoc resources.

Option 2 allows making significant savings compared to option 1 but is bound to one year commitment.

End-to-end integration service allowing the connection of the same devices based on customers’ existing systems and applications.

According to analysts in 2015, Atos is positioned as one of the main players in IoT. Atos has experience in numerous vertical applications of IoT technologies and this is backed with a significant amount of commercial references. Understating the business of our customer is crucial to provide the best IoT solution to a specific problem and context.

Atos has started to introduce FIWARE as underlying technology for Smart Cities. Actually, Atos is deploying FIWARE in two different pilots, one with the city of Malaga (Spain), where a mobile app improves city transport for citizens and the other one in Eindhoven (Netherlands) about smart lighting for traffic management. In both cases, Atos is integrating FIWARE with existing systems, sensors and specific city services.

IoT solutions based on FIWARE

Beyond the use of FIWARE in Smart Cities, and taking advantage of Atos expertise in IoT technologies, Atos offers also vertical applications based on FIWARE for different domains such as Industry 4.0 or Agrifood (see Atos IoT solution for Smart Cities). According to analysts, FIWARE is a suitable technology to pilot IoT Solutions in manufacturing, constructions, logistics, or utilities large companies.

The proven integration of FIWARE with existing commercial tools leverages the value of FIWARE for many other sectors, bringing interoperability and modularity at a competitive price.

Innovation Management

Do you need to catch up with innovation?

We are here to help you!

Based on its day to day activity, the Atos Research & Innovation team (ARI) has developed efficient working processes, methodologies, knowledge and collaborative tools that can be expanded for the benefit of customers.

From strategy to project management, from the generation of ideas to the identification of funding opportunities and selection of the right partners, from opportunities to results, our extensive experience enables us to provide reliable Research, Development and Innovation (RDI) support and consulting services.

The challenge is to improve the competitiveness of companies and / or public bodies through the integration of research, development and innovation activities in their operations. Research and innovation public programs support organizations in carrying out innovative projects.

However, not all organizations have the expertise or the abilities to manage this support properly. Furthermore, to remain competitive, businesses need to internationalize their knowledge or technology, entering projects that cannot be performed individually but in cooperation with partners all over Europe and beyond.

We offer support services that cover the whole cycle, from identification of funding sources and programs, to proposal preparation, including the establishment of partnerships.

Support services also include contract negotiations, as well as the following administrative / financial management and technical coordination of funded projects.

Additional services are related to the innovation process and consist among emerging technologies, watch ideas generation, innovation management, etc.

Benefits can be summarized as follows:

- Be at the cutting edge of innovation
- Access to and participation in R&D programs
- Work in collaboration with organizations all over Europe
- Gain competitiveness.

All these benefits are supported by state of the art methodologies and IT tools in order to offer efficient and skillful support.

The benefits for our customers are increased possibilities to start and undertake research and innovation activities. It also allows them to network and cooperate with key players in RDI (e.g. research institutes, universities, companies, etc.), which is an added value in view of the creation of partnerships, alliances and internationalization. Benefits can be summarized as follows:

- Be at the cutting edge of innovation.
- Access to and participation in R&D programs.
- Work in collaboration with organizations all over Europe.
- Gain competitiveness.

Document: Idea Generation Workshops
Research & Innovation 2017

CityGO

Powered by FIWARE

Description

CityGO provides an innovative, easy and customizable solution to any city, conforming to two complementary tools:

- CityGO Mobile application, which indicates to the user what public transport options are available at any time for a particular route. For instance, it suggests options such as electric car sharing, buses, the nearest public bike rental station, available parking spaces, etc. Everything is managed in real time to obtain an optimal route based on data provided by the sensor network and open data from the city.
- CityDash. Web-based dashboard for the city municipality control center, which allows civil servants to visualize all the data coming from the city sensors network to support everyday decision making and evidence informed analysis to improve the traffic planning in the city in times of high tourist's flows, sport events, among others.

Solution

The key features of CityGO can be summarized as:

- Based on the user profile (GPS position, usual routes, preferences), it adapts the routes to each user taking into account daily routines to provide personalized recommendations, providing information about buses lines and stops, status of traffic and queues, bus schedules, car sharing, bicycle renting, and others, all in real-time.
- Additionally, the key features of CityDash are:
  - Dashboard that enables the visualization of real-time information, time-series indicator data and interactive maps about all aspects of the city, including: city traffic flow, people movements, car and bus fleets, location of citizens connected to the Mobile App video map showing citizens movements the previous day, and others.

Benefits

The benefits of CityGO and complementary of CityDash are relevant for citizens, local authorities and public transport operators. Low-cost development and deployment of customized urban mobility CityGOapp (not limited to multimodal journey planner) is the main enabler for passenger data analytics.

Benefits for the user are related to the recommendations on what the best itinerary to take and what the best means of transport based on the real-time information in a proactive way, so the user doesn't have to express his exact itinerary every time.

For the city, the app presents real advantages as it gives information on users' regular routines that allows better planning of routes, better usage and possible adjustments, traffic lights, etc. CityGO gives information on bus routes, lines information and also what the user does before and after taking a given bus. Also, the bicycle information systems provide information on users and how many parking spaces available are needed.

Business Challenge

Today 54% of the world population lives in cities and by 2050 this figure is estimated to reach 66%. If we want to reduce pollution, mitigate climate change, and contribute to have cities of the future smarter and more livable for everyone, we must tend towards the use of public transport. Moreover, efficient urban mobility goes far beyond multi-modal journey planning. Local authorities also need to focus on traffic flow optimization and environmental issues. Consisting in this scenario, Atos has developed CityGO, a mobile application for users to plan their city itineraries according to their preferences and usual habits, complemented with a web application for the municipality of the cities called CityDash.

CityGO

Your health at your fingertips

Description

Pocket mHealth is composed of a patient oriented smartphone application and a set of desktop applications installed at healthcare stakeholders systems with access to the HIS using connectors. The mobile application allows carrying, accessing and transferring the personal medical information in the form of a standardized Electronic Health Record - making use of different healthcare standards like openEHR/EN13606 and HL7 FHIR, and well-known terminologies such as SNOMED-CT. The tools installed at the hospitals allow accessing the HIS using configured templates, normalizing the clinical data and transferring the record to the smartphone using Bluetooth. The mobile application can bring together the clinical information coming from different HIS and is totally transparent to patients. The solution provides not only the benefits of a connected practice or organization such as clinical efficacy improvement, healthcare cost savings and increase of overall care quality, but also supports the care transformation that is enabled by a patient centered approach.

Solution

Pocket mHealth

• The mobile application allows carrying, accessing and transferring the personal medical information in the form of a standardized Electronic Health Record - making use of different healthcare standards like openEHR/EN13606 and HL7 FHIR, and well-known terminologies such as SNOMED-CT.
• The tools installed at the hospitals allow accessing the HIS using configured templates, normalizing the clinical data and transferring the record to the smartphone using Bluetooth.
• The mobile application can bring together the clinical information coming from different HIS and is totally transparent to patients.
• The solution provides not only the benefits of a connected practice or organization such as clinical efficacy improvement, healthcare cost savings and increase of overall care quality, but also supports the care transformation that is enabled by a patient centered approach.

Benefits

The potential benefits that might be achieved by the analysis of the information generated by the patient throughout its complete care process between different healthcare stakeholders are the following:

• Acceleration of clinical research
• More accessible and better developed measures of clinical performance
• Increased public health monitoring and disease management
• New care delivery models
• Patient self-management
• Better care coordination across settings
• New data that supports decision making
• The clinical information complies with the “distributed interoperability” paradigm because the driver for the exchange of medical data is the patient.

Business Challenge

Healthcare organizations are currently expected to adopt a position towards data openness that is aligned with a patient centered approach. However, they need to break down data silos between them to be able to provide appropriate services to patients. Their challenge is to enable patients to become the driver of the change, bringing standardized pieces of EHR in the mobile, what we call “distributed interoperability”. Additionally, important saving on resources can be achieved by supporting a zero paper policy that delivers a better experience to the patient, with faster processes between different health facilities or experts.
### Publications

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<td>Towards a Privacy-preserving Reliable European Identity Ecosystem</td>
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<td>Angel Patamino</td>
<td>International Journal of Medical Informatics, Volume 101, May 2017, Pages 108-110</td>
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<td>Privacy Data Management and Awareness for Public Administrations: A Case Study from the Healthcare Domain</td>
<td>Jose Francisco Ruiz, Javier Garcia Robles</td>
<td>FP2007 - ENISA Annual Privacy Forum 2017, 7 – 8 June 2017, Vienna</td>
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Over the past decade, cloud services emerged as one of the most promising technologies in IT. Since cloud computing allows improving the quality of software and, at the same time, aims at reducing costs of operating software and hardware, more and more software is delivered as a service in the cloud. However, moving existing software applications to the cloud and making them behave as software-as-a-service is still a major challenge. In fact, in addition to technical aspects, business aspects also need to be considered. The ARTIST EU project (FPT) proposes a comprehensive model-based modernization approach, covering both business and technical aspects, to cloudify already existing software. In particular, ARTIST employs MDE techniques to automate the reverse engineering and forward engineering phases in a way that modernized software truly benefits from targeted cloud environments. In this paper, we describe the overall ARTIST approach and present several lessons learned.

Grammar-based genetic programming for software configuration problem

Software Product Lines (SPLs) capture commonalities and variability of product families, typically represented by means of feature models. The selection of a set of suitable features when a software product is configured is typically made by exploring the space of broad off-upon different attributes of interest for instance, cost and value. In this paper, we present an approach for optimal product configuration by exploiting feature models and grammar-guided genetic programming. In particular, we propose a novel encoding of candidate solutions based on grammatical representation of feature models, which introduces relations imposed in the feature model are respected by the candidate solutions.

Large Scale Surveillance, Detection and Alerts Information Management System for Critical Infrastructure


Frontiers in Spectral imaging and 3D Technologies for Geospatial Solutions

The Institute of Communications and Computer Systems (IKCS) of the National Technical University of Athens (NTUA) has presented paper to conference ISPRS SPEC3D to be held in October 2017 in Jyväskylä, Finland. Paper is named “Frontiers in Spectral imaging and 3D Technologies for Geospatial Solutions”.

An integrated information lifecycle management framework for exploiting social network data to identify dynamic large crowd concentration events in smart cities applications

Juan Sancho et al


Adaptive Filtering as a Service for Smart City Applications

Elke Herrmann et al

Filtering, Smart cities, Tools, Monitoring, Intelligent sensors

Privacy-Enhanced Tokens for Authorization in APE (Updated v5)

Daniel Calvo et al

IETF 96 - Berlin, Italy

SHAR-Q: Interoperability and decentralization as axes of the future energy ecosystem

Juan Rico, Martin Wagner, Ugo Stocchi, Guadalupe Rodriguez

IV Smart Grids Congress, Madrid, Spain

Common and open APIs on all platforms

Martin Wagner, Guadalupe Rodriguez

IV Smart Grids Congress, November 2017 - Madrid, Spain Page 161

IntoCRdY: Enabling platform for the transformation of Smart Grids

Andrea Rosa, Javier Vallejo, Marta Guadalupe Rodriguez

IV Smart Grids Congress, November 2017 - Page 155

Cognitive hyperconnected digital transformation - Internet of things intelligence evolution

Javier Vallejo et al


Drivers, Standards and Platforms for the IoT: Towards a digital VICINITY

Juan Rico et al

IEEE Intelligent Systems Conference 2017 - September 2017 - London, UK

Real time energy efficiency optimization in connected electrical vehicles

Juan Rico, Daniel Calvo, Juan Sancho, Miguel Rodriguez, Martin Wagner, Andrea Ross, Miguel Matos

IEEE Electric Vehicles and Renewable Energy ENERGY - April 2017 - Monza, France

Road2CPS Priorities and Recommendations for Research and Innovation in Cyber-Physical Systems

Nuno de Lima, Juan Alonso, Juan Rico et al

January 2017 - ISBN: 978-3-95663-117-7

Marshaling information and communication technologies towards ubiquitous personalized learning experiences

Ana Mª Piñuela, Nadia Politou et al

IEEE Communications Magazine (To be published)

Emerging ICT technologies for the public sector - How innovating the public sector helps meeting societal needs

Nuno Rodrigues, Esther Garrido et al

Zaro IKE/IEEE ITMC conference 2017

EO Big Data analytics for the discovery of new trends of marine species habitats in a changing global climate

José Lorenzo et al

Paper Poster from the EO4wildlife project (eo4wildlife.eu), accepted at the Conference on Big Data from Space (BDS17) held in Toulouse, France in November

EO Big Data Connectors and Analytic for Understanding the Effects of Climate Change on Migration Trends of Marine Wildlife

José Lorenzo et al

Paper describing some of the research activities of the EO4wildlife project (eo4wildlife.eu) that received the Best Paper Award at the International Symposium on Environmental Software Systems (ISESS) 2017 Conference held in Zadar, Croatia, in May
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<td>EFUS Conference 2017</td>
<td>WATIFY: Awareness raising campaign for the modernization of Europe’s industry</td>
<td>Alpso Pasic</td>
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<td>European Big Data Value Forum 2017</td>
<td>Big Data Value PPP networking sessions organised by R&amp;Ds project</td>
<td>Núria de Lama</td>
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<td>WATIFY Webinar</td>
<td>Digital Transformation for the Olympic Games</td>
<td>Jaimo Pérez</td>
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<td>WATIFY Webinar</td>
<td>Using HPC for boosting the Industry</td>
<td>Javier Nieto de Santos</td>
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<td>WATIFY Webinar</td>
<td>AI and Robotics for the Digital Age</td>
<td>Óscar de Alava</td>
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<tr>
<td>Information Security Solutions Europe (ISSD)</td>
<td>Three presentations about TREDSEC project including exploitation, innovation and demo of the TREDSEC Framework</td>
<td>José Francisco Ruiz, Elisa González</td>
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<tr>
<td>European Utility Week</td>
<td>Booth - interGRIDy project</td>
<td>Javier Valero, Andrea Rossi</td>
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<tr>
<td>CEN/CENELEC Workshop</td>
<td>CEN/CENELEC Workshop Agreement preparation meeting</td>
<td>Alpso Pasic</td>
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<tr>
<td>Digital Transformation of Public Administrations Event</td>
<td>Sustainability and Exploitation of Horizon 2020 eGovernment Projects Results: SONNETS</td>
<td>Esther Gamdo</td>
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<td>Atos Research and Innovation Digital Show</td>
<td>Presentation of ARIs key assets such as: Pocked minisat; City Go; PAM and Capture4E Presentation of WATIFY and WISER</td>
<td>Lydia Montandon, Alpso Pasic, Malena Dornato, Tomas Panioto, Angel Palomares, Carlos Cavin</td>
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<td>Global R&amp;D Innovation Excellence Summit</td>
<td>WATIFY Campaign: Boosting digital and technological transformation</td>
<td>Lydia Montandon</td>
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<tr>
<td>Event</td>
<td>Presentation Title</td>
<td>Speaker</td>
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<td>The Joint Showcase Event of ABC4EU and BODEGA projects</td>
<td>ABC4EU Mobile System Demo</td>
<td>Ross Little, Finland</td>
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<tr>
<td>IFWIRE Summit 2017</td>
<td>Smart Supply Chain Panel</td>
<td>Jorge Rodriguez, Utrecht, Holland</td>
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<td>Porvoo 19 Conference: Identity in a changing world</td>
<td>ARIES EU Project: Virtual and mobile IDs cryptographically derived from strong eID documents</td>
<td>Nicolás Notario, Rome, Italy</td>
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<td>CIPRE 2017</td>
<td>ZONIEC towards an EU framework for the security of widezones</td>
<td>José Ramón Martínez Salio, The Hague</td>
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<tr>
<td>SONNETS workshop: Innovating the public sector with emerging ICTs - development of research directions</td>
<td>Introduction to the SONNETS project</td>
<td>Nuria Rodríguez, Cologne, Germany</td>
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<tr>
<td>III Congreso de Ciudades Inteligentes</td>
<td>SMART-FI faciliza usar y compartir los datos abiertos de las Ciudades Inteligentes</td>
<td>Malena Donato, et al, Madrid, Spain</td>
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<td>ClimateEurope Festival</td>
<td>CLARITY: Integrated Climate Adaptation Service Tools for Improving Resilience Measure Efficiency</td>
<td>Miguel Ángel Esteban, Valencia, Spain</td>
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<tr>
<td>Setting the basis for a future Operational Control Platform for CSDP missions' workshop</td>
<td>Introduction to CYLEX, objectives, strategy and potential users</td>
<td>Sara Díaz Mínguez, Brussels, Belgium</td>
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<tr>
<td>Artemis Brokerage Event 2017</td>
<td>WATIFY Campaing: Boosting digital and technological transformation</td>
<td>Nuria de Lama, Brussels, Belgium</td>
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<tr>
<td>Parallel End-User and Supplier Workshops on standardisation needs and opportunities</td>
<td>New standardization opportunities for industry</td>
<td>Jaime Martín Pérez, Brussels, Belgium</td>
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<td>Jornada sobre el topic SEC-05-DRS-CBRN-2017</td>
<td>Atos approach for DRS-05</td>
<td>Jaime Martín Pérez, Madrid, Spain (CDTI)</td>
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<tr>
<td>SONNETS workshop: Emerging ICTs and Innovation Potential for the Public Sector</td>
<td>The SONNETS project: An Introduction</td>
<td>Nuria Rodríguez, The Cube, Athens, Greece</td>
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<tr>
<td>Digital Social Innovation Fair 2017</td>
<td>WATIFY Campaing: Boosting digital and technological transformation</td>
<td>Lydia Montandon, Rome, Italy</td>
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<tr>
<td>Chemical, biological, radiological and nuclear (CBRN) cluster</td>
<td>Atos overview, competencies and ideas for CBRN</td>
<td>Jaime Martín Pérez, Paris, France (Ministère de la.</td>
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<tr>
<td>Smart Cyber-Physical Systems - Concertation Event</td>
<td>Road2CPS final results</td>
<td>Nuria de Lama, Brussels, Belgium</td>
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</table>

**Prizes 2017**

**Best Booth Award at EuCNC for the iKaaS Project**

The iKaaS project received the “Best Booth Award” at the EuCNC 2017 held in Oulu, Finland from 12-15th of June. The exhibition comprised some 40 stalls, showing both commercial and research demos. The iKaaS booth was voted as the best demo at conference.
Platforms

Introduction

Even though most Public Bodies carry out public and private consultations to elaborate their research program, in the last years there has been an industry-led movement aiming at better coordinating and defining research areas and instruments, both at European and National levels. The main benefit of these initiatives is that industrial partners, including SMEs (in many cases also academia and research centers), discuss which are the main priorities for the sector in terms of R&D and provide this input to the related funding organisations. This ensures a greater impact of the program. The main characteristics of these initiatives are that they are well organized, with mechanisms for open participation and represent a critical mass of stakeholders with a unique voice. Therefore, they are considered the natural interface to interact with a specific industry or sector.

Nowadays the spectrum of initiatives is quite vast in terms of both thematic areas and instruments. From an instrument point of view we can distinguish ETP (European Technology Platforms), JTI (Joint Technology Initiatives), Lead Market Initiatives and PPP (Public Private Partnerships).

From the viewpoint of research areas, we depict hereafter a brief classification of current ETP, JTI, PPP and other initiatives. It is by no means a complete list, but a selection of some relevant initiatives for Atos, where the Research & Innovation group plays a major role.

Nuria De Lama
ICT Program Manager
Atos is a founding member of the European Technology Platform NESSI (Networked European Software and Services Initiative) and sits on the steering board of NetWorld2020.

**European Technology Platforms (ETPs)**

- NEM: [www.neminitiative.org](http://www.neminitiative.org)
- NESSI: [www.nessi-europe.com](http://www.nessi-europe.com)

**Public Private Partnerships (PPPs)**

Our company is a major partner in Future Internet related initiatives being member of the FI PPP Steering Board and Industrial Advisory Board. Since 2014, Atos is a founding member of the Big Data Value Association (BDVA), assuming the roles of Vice-presidency and Deputy Secretary-general. We are also member of the 5G PPP Steering Board.

**National Technology Platforms (NTPs)**

Atos is currently holding the Presidency and Secretary of PLANETIC for ICT, as well as the Vice-presidency of eInternet for Future Internet technologies, and is member of several others, such as PESI, Logistop, eVIA for Health and Independent Living, NanoMed or the Spanish Railways Technology Platforms.

**EIT Knowledge and Innovation Communities (KICs)**

Atos is a core member of the KIC EIT Health and an official member of the KIC EIT Digital associated node Madrid.

**Standardization Organizations**

- OASIS: [www.oasis-open.org](http://www.oasis-open.org)
- ETSI: [www.etsi.org](http://www.etsi.org)

**Special Interest Groups**

- FIWARE Foundation: [www.fiware.org/foundation](http://www.fiware.org/foundation)
- ERTICO: [ertico.com](http://ertico.com)
- EOS: [www.eos-eu.com](http://www.eos-eu.com)
- CELTIC: [celticplus.eu](http://celticplus.eu)
Atos SE (Societas Europaea) is a leader in digital transformation with circa 100,000 employees in 72 countries and pro forma annual revenue of circa €12 billion. Serving a global client base, the Group is the European leader in Big Data, Cybersecurity, Digital Workplace and provides Cloud services, Infrastructure & Data Management, Business & Platform solutions, as well as transactional services through Worldline, the European leader in the payment industry. With its cutting edge technologies, digital expertise and industry knowledge, the Group supports the digital transformation of its clients across different business sectors: Defense, Financial Services, Health, Manufacturing, Media, Utilities, Public sector, Retail, Telecommunications, and Transportation.

The Group is the Worldwide Information Technology Partner for the Olympic & Paralympic Games and is listed on the Euronext Paris market. Atos operates under the brands: Atos, Atos Consulting, Atos Worldgrid, Bull, Canopy, Unify and Worldline.

Find out more about us
atos.net
atos.net/career
More thoughts and inspiration at ascent.atos.net

Let's start a discussion together

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