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Progress on Exploitation and Dissemination Plans-Part II

Miguel Lopez, José Ramón Quirós, José María Ocón, Miguel Angel Monjas, Bruno Ordogoizti, Bo Zhu, Sandra Gómez, Stanislav Vararuv, Alberto Mozo, Daniele Apiletti, et al.

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Progress on Exploitation and Dissemination Plans - Part II

**ONTIC Project
(GA number 619633)**

**Deliverable D6.5
Dissemination Level: PUBLIC**

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1.2	2016-01-22	SATEC	First Review
1.3	2016-01-19	SATEC, EMC, UPM	Second Review
1.4	2016-01-30	UPM	Addition of ONTS availability
1.5	2016-01-31	SATEC	QA Review

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1. Acronyms and Definitions

Acronyms

Table 1: Acronyms

Acronym	Defined as
ACM	Association for Computing Machinery
ADBIS	Advances in Databases and Information Systems
BigDAP	Big Data Applications and Principles
EDF	European Data Forum
ICDM	International Conference on Data Mining
IEEE	Institute of Electrical and Electronics Engineers
ISBN	International Standard Book Number
IPR	intellectual property rights
ISP	Internet Service Provider
KPI	Key Performance Indicator
NOMS	Network Operations and Management Symposium
ONTIC	Online Network Traffic Characterization
QoE	Quality of Experience
QoS	Quality of Service
SAPC	smart Policy Control
SLA	Service Level Agreement
R&D&I	Research and Development and Innovation



2. Executive Summary

This deliverable presents the progress in the exploitation and dissemination plans for the project [1] [2] during the second period (second year) of the project by describing the activities performed in order to implement these plans and it is an update of deliverable D6.4 [2]

The set of activities include scientific papers, journals and conferences of interest, IPR, press releases, and a list of relevant industrial associations that are interested in the project activities and outcomes. Both future and current to-date activities are presented, targeting different scientific communities, students, stakeholders and decision makers.



3. Suggested previous readings

The contents of this document are the development of the exploitation strategy, the exploitation plans and the dissemination plans. Those plans and strategy have been described in the following documents and therefore its reading is recommended:

- ONTIC. Deliverable D6.3. “Exploitation Strategy”. May 2014.[1]
- ONTIC. Deliverable D6.4, “Exploitation and Dissemination Plans”. January 2015.[2]



4. Dissemination Activities During Second Period

4.1 Conferences, workshops and journals

4.1.1 POLITO scientific dissemination

Specifically addressing scientific dissemination, currently published conference papers are listed below:

- Elena Baralis, Luca Cagliero, Paolo Garza, Luigi Grimaudo.
PaWI: Parallel Weighted Itemset Mining by Means of MapReduce.
IEEE International Congress on Big Data (BigData Congress),
New York, NY, June 27-July 2, 2015, pp: 25-32, ISBN: 978-1-4673-7277-0
<http://dx.doi.org/10.1109/BigDataCongress.2015.14>
- Daniele Apiletti, Elena Baralis, Tania Cerquitelli, Paolo Garza, Fabio Pulvirenti, and Pietro Michiardi.
PaMPa-HD: a Parallel MapReduce-based frequent Pattern miner for High-Dimensional data.
IEEE International Conference on Data Mining (IEEE ICDM), 3rd International Workshop on High Dimensional Data Mining (HDM'15), November 14-17, Atlantic City (New Jersey, USA).
- Daniele Apiletti, Paolo Garza, Fabio Pulvirenti.
A Review of Scalable Approaches for Frequent Itemset Mining.
19th East-European Conference on Advances in Databases and Information Systems (ADBIS), 2nd International Workshop on Big Data Applications and Principles (BigDap 2015), September 8-11, 2015, Futuroscope, Poitiers, pp: 243-247.
- Daniele Apiletti, Elena Baralis, Tania Cerquitelli, Paolo Garza, Luca Venturini.
SaFe-NeC: a Scalable and Flexible system for Network data Characterization.
IEEE/IFIP Network Operations and Management Symposium (IEEE NOMS), Istanbul, Turkey, 25-29 April 2016.

Furthermore, two additional papers have been prepared; they are under submission to ISI-indexed journals:

- A review of state-of-the-art distributed Frequent Itemset Mining algorithms, with real-world experimental sessions, by Daniele Apiletti, Elena Baralis, Paolo Garza, and Fabio Pulvirenti
- A review of state-of-the-art distributed clustering algorithms, with real-world experimental sessions, as a joint work between Polito and UPM research teams.



4.1.2 UPM scientific dissemination

Regarding to scientific dissemination, the following list represents the accepted papers presented by UPM in the second period:

- B. Ordozgoiti, S. Gomez, A. Mozo
Parallelized Unsupervised Feature Selection for Large-Scale Network Traffic Analysis.
24th European Symposium on Artificial Neural Networks, Computational Intelligence and Machine Learning ESSAN16, Bruges (Belgium), 27 - 29 April 2016. ESSAN is rated as Core B.
- B. Zhu, B. Ordozgoiti, A. Mozo
PSCEG: An unbiased Parallel Subspace Clustering algorithm using Exact Grids.
24th European Symposium on Artificial Neural Networks, Computational Intelligence and Machine Learning ESSAN16, Bruges (Belgium), 27 - 29 April 2016. ESSAN is rated as Core B.
- B. Ordozgoiti, S. Gomez, A. Mozo.
Massively Parallel Unsupervised Feature Selection on Spark.
19th East-European Conference on Advances in Databases and Information Systems (ADBIS), 2nd International Workshop on Big Data Applications and Principles (BigDap 2015), September 8-11, 2015, Futuroscope, Poitiers.
This work was selected as one of the best papers in BigDAP15 and consequently proposed by the ADBIS Chair for its submission in extended form to a special issue of the Information Systems Frontiers Journal (JCR indexed journal).
- B. Zhu, A. Mara, A. Mozo
CLUS: Parallel subspace clustering algorithm on Spark
19th East-European Conference on Advances in Databases and Information Systems (ADBIS), 2nd International Workshop on Big Data Applications and Principles (BigDap 2015), September 8-11, 2015, Futuroscope, Poitiers.
- B. Ordozgoiti, S. Gomez, A. Mozo
NPEPE: Massive Natural Computing Engine for Optimally Solving NP-complete Problems in Big Data Scenarios
19th East-European Conference on Advances in Databases and Information Systems (ADBIS), 2nd International Workshop on Big Data Applications and Principles (BigDap 2015), September 8-11, 2015, Futuroscope, Poitiers.

The following list includes submitted (under review) Papers:

- B. Ordozgoiti, S. Gomez, A. Mozo
Probabilistic Leverage Scores for Parallel Unsupervised Feature Selection on Massive High-Dimensional Datasets.
SIAM International Conference on Data Mining SDM16. SIAM-SDM is rated as Core A.
- A review of state-of-the-art distributed clustering algorithms, with real-world experimental sessions, as a joint work between Polito and UPM research teams.



4.1.3 CNRS scientific dissemination

Regarding to scientific dissemination CNRS has presented the following paper in the second period:

- Juliette Dromard, Gilles Roudière and Philippe Owezarski.
Unsupervised Network Anomaly Detection in Real-time on Big Data.
19th East-European Conference on Advances in Databases and Information Systems (ADBIS), 2nd International Workshop on Big Data Applications and Principles (BigDap 2015), September 8-11, 2015, Futuroscope, Poitiers

4.2 BigDAP2015 workshop

The Second International Workshop on Big Data Applications and Principles, BigDAP 2015, is the second Workshop sponsored by ONTIC. The key topics of the Workshop included the application of scalable Big Data analytics to network traffic characterization, the main theme of ONTIC, as well as to other application domains.

For enhancing visibility and attendance, BigDAP 2015 was co-located with the 19th East-European Conference on Advances in Databases and Information Systems (ADBIS 2015) at Poitiers, France. ADBIS is a Core-B conference. The workshop took place on Tuesday, September 8, 2015 with 10 presentations, including an invited talk and arranged into two sequential tracks: a scientific and an industrial track. Half of the presentations came from external authors, while attendance was definitely satisfactory.

To promoting the dissemination of the work activities and results of the ONTIC project, the specific goals of BigDAP 2015 were:

- To provide a networking space for people in academic institutions and in the industry.
- To enhance the participation of graduate students, especially those enrolled in PhD programs related to Big Data, Big Analytics and Network Science.

The intended audience of the workshop can be grouped as follows:

- Industrial sector: professionals involved in R&D&I (Research, Development and Innovation) activities.
- Enterprise sector: representatives of SMEs and large corporations interested in improving their organizational structure and business intelligence by leveraging novel Big Data technologies and analytics.
- Professors and researchers whose research interests focus on activities carried out by ONTIC.
- PhD students who are working on a thesis related to the ONTIC activities.

BigDAP 2015 consisted of one track that gathered both industrial and academics perspectives. The sessions were structured in three parts separated by breaks. The first one featured an invited talk and one paper presentation, while the other two sessions featured 4 paper presentations each.

The topics of interest of BigDAP 2015 included but not limited to the following:

- Big Data applications
- Case studies on Big Data management and analytics
- Experiences with Big Data project development and deployment
- Big Data models, algorithms, and architectures
- Cloud computing techniques for Big Data



- Big Data management
- Programming models and environments to support Big Data
- Parallel, distributed computing and virtualization for Big Data
- Big Data frameworks and architectures
- Big Data integrity and privacy
- Big Data search and mining
- Big Data analytics and visualization/ Scalable Data Mining and Machine learning techniques
- Research challenges on Big Data management and analytics

The calendar for the event was established by the Programme Committee, as defined in the following table:

Table 2: BigDAP 2015 Important Dates

Important Dates	
April 17 th , 2015	Deadline for paper submission
May 3 rd , 2015:	Deadline for paper submission (EXTENDED)
May 29 th , 2015:	Notification of paper acceptance or rejection
June 12 th , 2015:	Camera-Ready Submission
June 22 nd , 2015:	Camera-Ready Submission (EXTENDED)
June 8 th , 2015	Early registration
July 5 th , 2015	Late registration

Changing from the previous year, the program was structured in a single block featuring all contributions and one invited talk. The program was divided into three sessions.

- Invited Talk: Computational Urban "Science". Dr. Daniele Quercia
- Accepted papers: 12 papers were submitted, of which 9 of them were accepted.

The BigDAP website offered a compilation of the information about the CFP, the accepted papers and the program of the workshop.

In the manner of the ONTIC portal, the BigDAP website contains links to the communication channels for diffusion and feedback (linking from/to the project's website and the project's twitter page)

The website can also be accessed directly through the following URL: <http://dbdmg.polito.it/bigdap2015/> as shown in Figure 1. BigDAP 2015 web page.

BigDap **2nd International Workshop on Big Data Applications and Principles**

2nd International Workshop on Big Data Applications and Principles (BigDap 2015)
Sept. 8th 2015, Futuroscope, Poitiers, France
in conjunction with the **19th East-European Conference on Advances in Databases and Information Systems (ADBIS 2015)**
September 8-11, 2015, Futuroscope, Poitiers, France

Session overview

BigDap 2015 is a workshop aimed at promoting and sharing research and innovation on Big Data. The workshop will allow researchers and practitioners to share their experiences on designing and developing big data applications, to discuss the big data open issues and to share new ideas and techniques for big data management and analysis.

Researchers are encouraged to submit their papers describing systems, platforms, algorithms and applications addressing all facets of a Big Data application. Industrial implementations of Big Data applications, design and deployment experience reports on various issues raising in Big Data Projects are particularly welcome. We call for research and experience papers as well as demonstration proposals covering any aspect of Big Data, with specific interests on Big Data analytics.

BigDAP 2015 will be sponsored by FP7 ONTIC project (Online Network Traffic Characterization, <http://ict-ontic.eu>) that is funded by European Commission. Therefore, the application of scalable Big Data analytics to network traffic

Figure 1. BigDAP 2015 web page

To promote the dissemination of the Workshop, several different channels were used:

- Via email, using international email distribution lists from academic fields related to Computer Science in Europe.
- Via email, sent by the Programme and Organization Committee members to personal contacts in academic and industrial fields.
- Using webpages and other internal or external dissemination means available in each of the consortium partners.
- Via the ONTIC project webpages, through the 'Event' and 'News' sections.
- Via twitter, using the official ONTIC project twitter.



The workshop proceedings have been generated by Springer in both digital and physical formats, and are available at <http://www.springer.com/us/book/9783319232003>

We estimate that about 50 persons attended the BigDAP Workshop; there is no official data disclosed by the ADBIS organization about the number of attendees at the main conference or at specific workshops.

ONTIC successfully organized the second BigDAP Workshop in co-location with ADBIS, 2015. The following summarize the main outcome of the event:

- Presentation and dissemination of the state of the art in different areas of research and development in the field of Big Data, both in the academic and the industrial worlds. The level of participation was satisfactory given that BigDAP is still young.
- Networking: New contacts have been established with people connected to the industrial and academic and/or scientific fields, achieving a useful interexchange of ideas and knowledge.
- Visibility: The ONTIC project work and results were made known to a wider industrial and scientific community.
- Encouragement of undergraduate and postgraduate students, especially PhD students, to get involved in research fields related to Big Data, Big Analytics and Computer Science.
- Produced a proceedings volume published by Springer, both in digital and physical format, with an associated ISBN.

4.3 Public Availability of the ONTS dataset

The ONTIC project had previously planned to make publicly available the ONTS dataset at the end of the project. As project reviewers recommended to publish it as soon as possible, we announced the public availability of the ONTS dataset on December 2015 via the ONTIC website and twitter. Details of this process can be found in Deliverable 2.5 (Progress on the Provisioning Subsystem), section 8. We also contacted with FP7 CSA Rethink-Big Project (<http://www.rethinkbig-project.eu>) to help us in the dissemination of this event. In addition, we plan to publish a small portion of ONTS in the University California Irving (UCI) Machine learning repository web site (<https://archive.ics.uci.edu/ml/datasets.html>) in the next weeks. UCI repository is a well-known dataset repository that is very popular among machine learning and data mining researchers, and so, it is a strategic place in order to amplify the announcement of this event.

4.4 Other activities

4.4.1 SATEC dissemination activities

In order to present the ONTIC project, partials results and possible commercial uses SATEC has made the following activities and actions:

- Big Data internal workshop for Business Development and sales department.
- Participation in the SATEC Big Data and Analytics internal task force.
- Adding ONTIC references in the customer proposals.

4.4.2 EMC dissemination activities

Several activities developed to create awareness of the ONTIC project inside EMC, focus in sales people as they are the right people to reach out our customers and partners:



- Quarterly sessions organized by Professional Services - EMC Spain, to explain sales force the kind of projects delivery team is working on. ONTIC project has been included as one of the Big Data references to tell our customers, to identify possible candidates interested in ONTIC goals and progress.
- As part of a global Big Data practice, we have worked at EMEA level to explain and give visibility of this project to another countries in the region; for that purpose, we have added the ONTIC project to our EMC Delivery Portal (Polaris web portal), that it's the first access point to get any project information inside the EMC federation (Figure 2):

The screenshot shows the EMC Polaris portal interface. At the top, there is a navigation bar with the Polaris logo and user information: "Welcome, Arias, Fernando-Spain". Below this is a search bar and a dropdown menu set to "This Site: ONTIC". The main content area is titled "ONTIC" and includes a "Description" section with a detailed paragraph about network traffic analysis. Below the description is a "Project Information" section with fields for Project Name (ONTIC), Client Name (European Commission), and Project Rollup (European Commission). The status is shown as "Active". To the right, there are sections for "Project Announcements" (listing "BIGDAP 2015") and "Project Links" (listing "Online Traffic Network Characterization portal").

Figure 2. EMC Polaris portal: ONTIC project

- Finally, ONTIC project was selected as runner up in the category of Most Innovative Project during 2014 in EMC Spain.

4.4.3 ADAPTIT dissemination activities

Adaptit has participated in the Mobile World Congress, Barcelona, February 2015, and presented the ONTIC project to visitors in its stand.

Continuing its dissemination activities from first year, the vision and work activities of ONTIC and the particular involvement of the company have been presented to a number of customers, including service, network providers and academia. These presentations happened during business meetings for showing the commitment and know-how of the company in the area of Big Data infrastructure solutions and analytics.

4.4.4 UPM dissemination activities

Other activities by UPM are listed in the following list:

- European Data Forum 2015 Sponsorship: UPM was one of the Silver Sponsors of the European Data Forum (EDF) 2015 (<http://2015.data-forum.eu/>) that took place on November 16-17, 2015 in Luxembourg. The **European Data Forum (EDF)** is a meeting for industry professionals, researchers, policymakers and members of community initiatives to discuss the challenges of Big Data and the emerging Data Economy and to develop suitable action plans for addressing these challenges. Of special focus for the EDF are Small and Medium-sized Enterprises (SMEs), since they are driving innovation and competition in many data-driven economic sectors. The topics discussed at the European Data Forum range from novel data-driven business models and technological innovations to societal aspects.



Next year, we plan not only to sponsor this relevant event but also to show its main results and specifically the three use case prototypes.

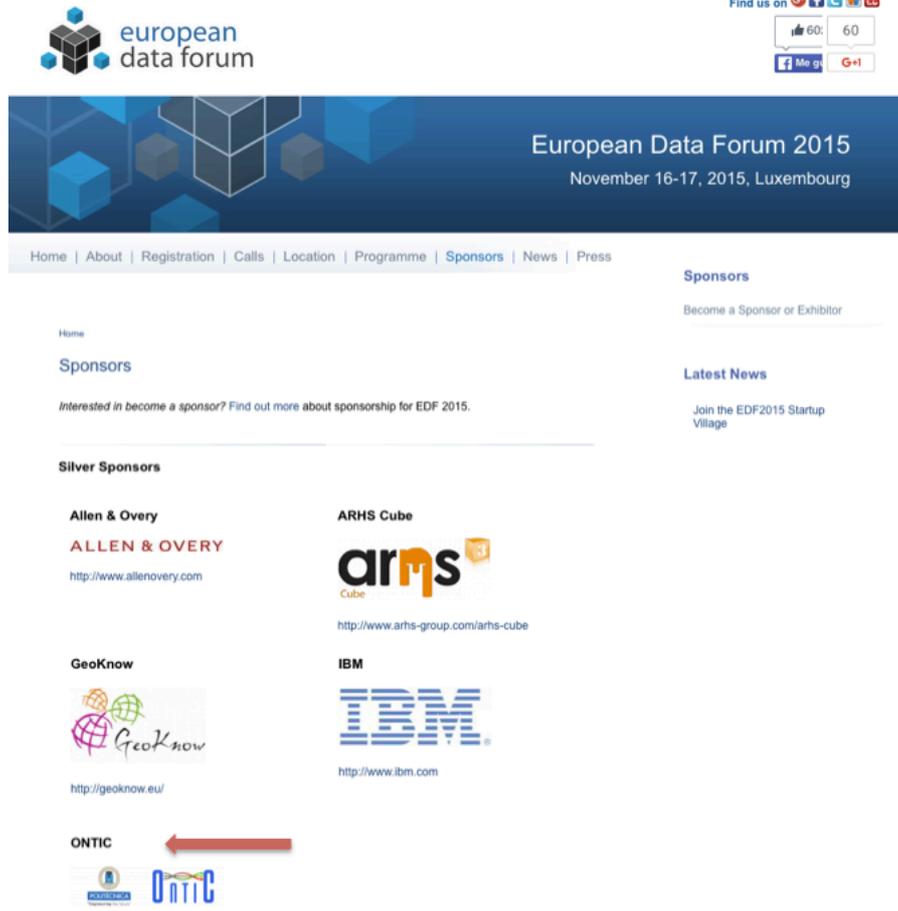


Figure 3. Sponsors page featured on the EDF web site (<http://2015.data-forum.eu/>)



Figure 4. Page 30 of the EDF 2015 Programme.



- Big Data article in UPM Journal: The UPM team contributed to the elaboration of an article about Big Data that appeared in the UPM Journal (n° 31, July 2015). In this article, the ONTIC project was mentioned as one of the most relevant projects currently coordinated by UPM in the field of Big Data. The URL for downloading the article (written in Spanish) is the following:
 - www.etsisi.upm.es/sites/default/files/noticias_tic/BigData_RevistaUPM.pdf
- Academic dissemination: UPM presented several ONTIC activities and outcomes at the following events:
 - Lecture on Machine Learning algorithms applied to telecom scenarios (2015), included in the subject “Network Science” (Master of Computer Sciences and Technologies) and taught at UPM in November 2015.
 - Lecture on Spark and Hadoop in the subject “Internet Services, Protocols and Applications” (Master of Distributed and Embedded Systems) and taught at UPM in October 2015.
 - Professor Alberto Mozo is mentoring three PhD candidates (two of them are part of the ONTIC team and the other is an intern sponsored by Ericsson Spain) in research topics closely aligned with ONTIC research activities.

4.4.5 POLITO dissemination activities

Daniele Apiletti and Elena Baralis held the second edition of a seminar on ONTIC technologies in the undergraduate course of “Database Management Systems” for the Computer Engineering students at Politecnico di Torino, Corso Duca degli Abruzzi 24, Torino, Italy, in December 2015. Recent advances in Big Data technologies related to ONTIC activities were presented to an audience of approximately 200 students enrolled for the course.

Furthermore, prof. Elena Baralis introduced ONTIC activities into her PhD course at the Dipartimento di Automatica e Informatica, Politecnico di Torino, held from mid-September to mid-October 2015 (10 lessons overall). ONTIC concepts and research activities were spread across different lessons covering clustering techniques, classification models and correlation analysis by means of association rule mining. The audience included approximately 20 PhD students, mostly coming from the Computer and Control Department.

Finally, Paolo Garza in Academic Year 2015-2016 is holding a new Master-degree course in Big Data technologies and techniques within the Computer Engineering degree. Contents and lessons have been greatly influenced by ONTIC research activities.

Polito plans to iterate on this activities in the next year, updating the contents and improving the dissemination based on the feedbacks of the audience.

4.4.6 CNRS dissemination activities

Philippe Owezarski has been involved in the design and set-up of a new joint specialty in the engineering schools and university of the city of Toulouse. This new joint specialty, called TLS-SEC (Toulouse Security) is related to the teaching of all aspects of security aspects in networking and software engineering. It includes a lecture given by Philippe Owezarski on network anomaly detection in high bandwidth networks. It includes the data mining and machine learning algorithms that have been designed in the framework of the ONTIC project, the documentation provided to students including ONTIC related papers.



CNRS also promoted the ONTIC project to academic and industrial colleagues that we had the opportunity to meet. It was successful with the BORDER6 company that signed a contract with CNRS about the UNADA technology transfer. We are also still negotiating a contract with Airbus for transferring them our anomaly detection algorithms in big data environments.

5. Exploitation Activities During Second Period

5.1 Ericsson exploitation activities during the second period

Ericsson contribution to ONTIC is focused on the so-called Quality of Experience use case. Therefore, it focuses on the Automated Management area (sometimes referred to as autonomic networks). The ambition to increase the degree of automation in a telecommunication network is not new. Autonomic networks have been a subject of research over the last 15 or so years, and technologies for increasing the workflow automation of getting business offerings to market has also been evolving. Recently, however, there have been advances in a few specific technologies that increase both the urgency to address automation as well as the possibilities to do so. These trends in themselves are further enabled by the possibilities of new computational, memory and storage capabilities.

The exploitation activities related to ONTIC carried out by the Ericsson are two-fold: on one hand, increasing awareness outside our company; on the other, addressing key stakeholders within the company in order to get the ONTIC findings and deliverables to the actual product evolution.

With regard to external awareness Ericsson has pursued to provide the means of the understanding of the scenario it is being addressed. "Adaptive Quality of Experience: A Novel Approach to Real-Time Big Data Analysis in Core Networks" [3] from the proceedings of the Second International Workshop BigDAP '15 has focused on describing the possibilities of actuation in telecommunication networks to mitigate situation of degraded QoE, by using the PCC architecture with ONTIC add-ons.

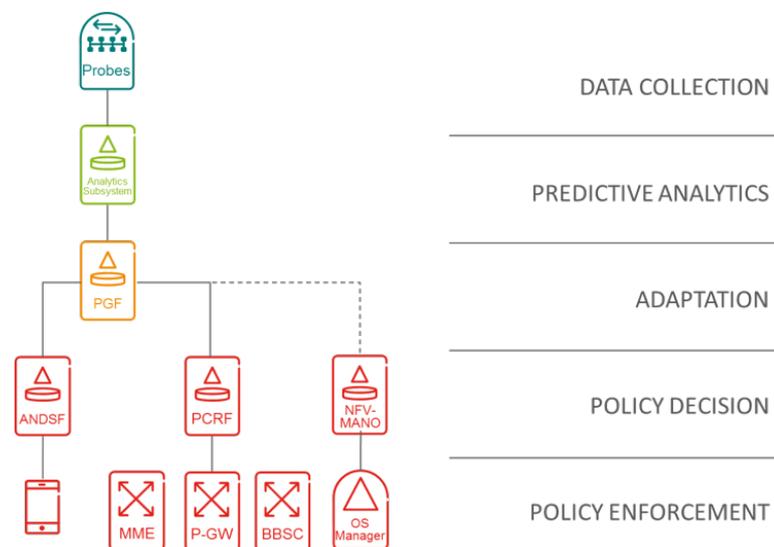


Figure 5. Adaptive Quality of Experience high-level architecture

A second set of actions to get external awareness are tied to actual interaction with the industry, in order to share insights and get feedback. The Adaptive Quality of Experience GUI mockup created during ONTIC's first year was refurbished to be used in the 2015 Mobile World Congress edition held in Barcelona in early 2015 March. As part of the wide Ericsson Analytics and Control offer (built around the Ericsson Expert Analytics product) [4] it was introduced as part of the topics for discussion and got useful insights from operators

and partners: how accurate QoE degradation predictions can be, how far in advance insights can be generated, which are the better policies for mitigating QoE degradation, and how fine-grained actuation can be.

In addition to that, members of the Ericsson ONTIC team have contacted the customer units in charge of both the analytics and customer experience products and services. The Adaptive QoE Control scenario is part of their innovation folder.

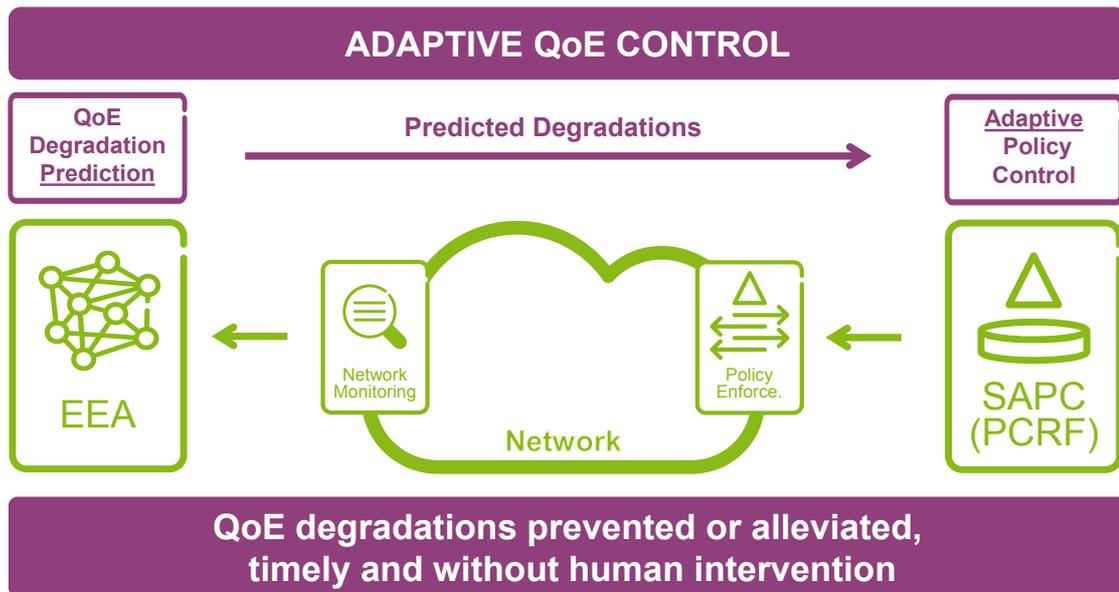


Figure 6. Adaptive Quality of Experience as link between EEA (QoE degradation prediction) and SAPC (policy decision)

For achieving successful exploitation, the ONTIC findings and deliverables have to be fed to the product organizations. So, communication and cooperation between the Ericsson Expert Analytics and Ericsson Service-Aware Policy Control product organizations have been brokered and support to cooperation activities has been provided. The first results were obtained in 2015, just in order to go to the market and get proper feedback: Dynamic Experience Management is a feature that has been tested and can be ordered by Ericsson customers. The insights provided by Ericsson Expert Analytics (EEA) on individual Customer Quality of Experience blended with smart Policy Control (SAPC) [5] allow real time network adaptation to solve identified service degradations for the greatest revenue producing, most valuable customers (Figure 6). Assuring a great application experience for these VIP customers creates value for both, the service consumers and the Mobile Broadband operators. This feature was showcased in the Ericsson Innovation Roadshow which was held in Madrid on October 20-22, 2015 [6]

Regarding internal activities, we can mention the contribution to the Ericsson COMPA architectural model. COMPA stands for Control/Orchestration/Management/Policy/Analytics and is an architecture concept with a set of guiding principles to simplify the operations (both management and business process) of the telecom networks [7]

- Policy is a function that governs the choices in behavior of a system.
- Management is the function that, with full lifecycles, coordinates the efforts to accomplish goals and objectives using available resources efficiently and effectively.

- Control is the functionality responsible for negotiating, establishing, maintaining and terminating dynamic data/user plane connections. Data that are changed by a control function will normally be lost in case of an outage.
- Orchestration describes the automated arrangement, coordination, and (resource) management of complex computer systems, middleware, and services (including networking).
- Analytics is in charge of turning data into information and insights that serve as a basis for decision making and triggering of actions.

Exposing network analytics insights enables the definition of network KPIs. A policy engine can use network analytics to check KPIs, triggering network updates when needed. Such requests could then be applied to the relevant network elements by the control-orchestration-management. A closed feedback loop, the so-called COMPA loop, from the control-orchestration-management functionality back to the policy engine would enable policies to learn and adapt automatically as the network environment changes.

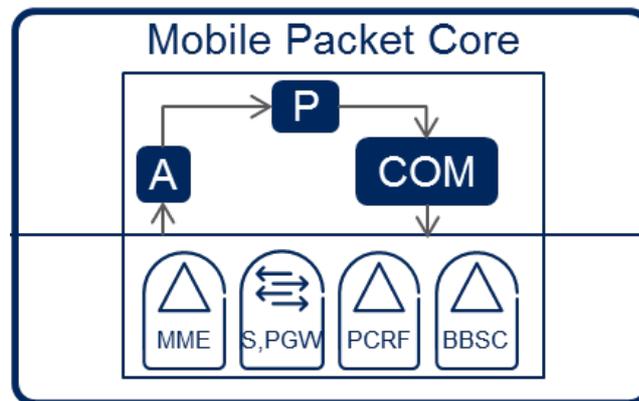


Figure 7. COMPA Architecture applied to Mobile Packet Core Networks

The Adaptive QoE scenario fits very well into this model and therefore its architectural findings have been fed to the COMPA architecture (Figure 7) so that it can benefit from real use cases that help to analyze its feasibility. In particular, the Analytics Function modelled in the Adaptive QoE scenario has been modelled as the “A” in COMPA while the functionalities assigned to the Policy Governance Module have been mapped to the “P” in COMPA.

To sum up, Ericsson exploitation activities are aimed to get the adoption of the policy functionalities described and developed within the Adaptive QoE Control scenario. On one hand, Ericsson has carried out diffusion and pre-commercial activities. On the other, has guaranteed that the adoption by the Ericsson product offering and the coherence with the architectural proposals for autonomic networks within the 5G umbrella.

5.2 SATEC exploitation activities during the second period

The main focus of SATEC in the second period has been centered in the development of the first version of the analytic dashboard which is defined as part of use case #1. This has implied the definition and implementation (integration of several modules, programming libraries and tools) of a realistic Big Data architecture, the functional definition of the

analytic dashboard for data network analysis, and eventually the implementation of the dashboard as a first proof of concept.

All that work has provided to SATEC a good expertise in Big Data and scalability which has been moved to the market in two different groups of customers: telco customer and non telco customers.

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The SATEC exploitation activities in the group of telco customers has been:

- Demonstrations on real time dashboard for network administrators.
- Software reengineering for NSIM product (currently installed in production in a very big international telco company). SATEC is moving current technical architecture to a Big Data one with the same components used in the Dashboard for ONTIC use case #1
- Proposals to real time software monitoring systems in data networks for telecom operators and ISPs

During the second period SATEC has contacted, has attended meetings and has sent commercial proposals (all about the technical bases enumerated above) with several costumers such as:

- TIWS (Telefonica International Wholesale Services).
- Vodafone
- Orange.

The activity in the group of non-telco customers has been targeted to the utilities, mainly electricity, gas and water), and specifically in the environment of Smart Grids.

In this area SATEC is developing proposals of services based in the consumption analysis, power balance, etc. in Smart Grids. SATEC is defining services that will be based in the ONTIC areas such as: feature selection (managing of variety of smart grid data), scalability (Big Data architecture to support the input of millions data from smart grid meters), data clustering, etc.

Some actual proposals in progress by SATEC are:

- Electricity consumption characterization tool.
- A system of expert support analysis for Smart Grid.
- SLAs verification system for gas transportation

During the second period SATEC has contacted, has attended meetings and has sent commercial proposals with the following non-telco costumers:

- Endesa.
- Gas Natural-Fenosa.
- Repsol.



5.3 EMC exploitation activities during the second period

During this second year we have been working closer with EMC sale forces to identify possible candidates interested in ONTIC goals and progresses. As ONTIC domain is focus on network traffic, our primary interest is in Telco companies, but we are trying also to explain this project to others companies as it can be used as a powerful reference to convince them about the benefits of adopting Big Data technologies.

We have seen also a special interest in one of the Use Cases we are working in ONTIC project, related with Video User Experience. There is an interest in improving the user experience of their customers when visualizing videos from the internet, and for this purpose, they are looking for ways to have more control of this, so any tool they could have to anticipate possible degradation in this service will be of interest for them.

In any case, this third year of ONTIC project will be critical for the success of any initiative we can have with our customers, as one of the first things they demand is a demonstration of the ONTIC capabilities and functionality; the sooner we have something to show to our customers, the easier will be to convince our customers how useful can be ONTIC outcome for them.

5.4 Adaptit exploitation activities during the second period

ADAPTIT is interested in ONTIC project results from the view-point of a solution provider. In particular, ADAPTIT is interested in the design and deployment of the project Big Data architecture for traffic characterization, its provisioning through the cloud and the analytics for extracting network and application performance insights and metrics. ADAPTIT is committed to capitalizing on the experience gained from its involvement in the project and on the collaboration with other partners of the consortium.

As set from the first year, the exploitation of project results spans two directions:

Strengthen the company's position in the market: The participation of ADAPTIT in ONTIC is exploited as a competitive advantage of the company for strengthening its position as a provider of infrastructure and performance management solutions.

The offering of Big Data solutions and analytics for performance management constitute areas of primary concern to the company and its involvement in the project (cloud-based Big Data set-up, analytics development and visualization) has strengthened its know-how in these areas. Relevant external dissemination activities for passing the company's know-how message are on-going.

Utilize the gained know-how and experience in innovative service offerings: Based on the acquired knowledge, ADAPTIT plans to further develop their Big Data analytics portfolio for infrastructure and performance management. Big Data-as-a-service is opted as a promising sales form. The strategy is to pursue FOA (First Office Application) for exhibiting the benefits of the proposed services, with ADAPTIT undertaking the cost of the pilot project.

To this direction, ADAPTIT has progressed during this year a business case, initiated from the first year, with First Data Hellas (www.firstdata.com/en_gr/home.html/) a branch of an international application service provider that acts as a 'centre of excellence' in infrastructure management. The case is concerned with the development and visualization of Big Data analytics for cost and revenue analysis and forecasting based on usage measurements. Evidently, this case is directly aligned with the activities of the company in ONTIC. A pilot project has been defined and a prototype has been developed (August-November 2015) and demonstrated to senior technical staff. Following positive feedback, a demonstration to the executive management level is scheduled by the end of 2015.



Furthermore, presales and technical teams have been formed for undertaking direct customer contacts, presentations and pilot projects, targeting at customers in the EMEA region. Building on the business case with First Data, a meeting with Cosmote Greece, nowadays a convergent network (fixed and mobile) service provider, part of the Deutsche Telecom Group, is in the agenda within H1 of 2016.

5.5 UPM exploitation activities during the second period

Collaborations with Industrial partners made by UPM are listed below:

- IBM Dublin Software Lab: We have contacted members of this Lab with a special research interest in Applied Predictive Modeling, Machine Learning, Data Analytics, Big Data and Pervasive Computing. They would like to share some datasets with us to exploit them in the context of online network traffic classification and prediction. In addition, IBM declared several months ago that they are going to officially support Spark. Therefore, we plan to exchange with them know-how for the development of efficient and scalable machine learning algorithms on top of Spark.
- Bell Labs Israel: This prestigious research institute contacted us to express their interest in exploring a joint collaboration in the application of Machine Learning and Data Mining models to energy efficiency and performance in Network Function Virtualization (NFV) scenarios.
- Telefonica: UPM has been invited to join an ambitious research proposal lead by Telefonica to design and deploy innovative machine learning algorithms in the context of network management in 5G networks. This proposal will be submitted to the Spanish Ministry of Economy in the next few months.
- JOT Internet: This Spanish SME develops and implements advanced media advertisement solutions. We are planning to jointly explore the application of analytics in Big Data media scenarios using Spark and Storm as Big Data frameworks during the next year.
- Enertika is a Spanish SME that designs and installs air conditioning solutions for telecom antenna towers. We have started preliminary contacts to collaborate in the development of advanced Machine Learning models to design and implement energy efficient solutions for these antenna towers.

5.6 CNRS exploitation activities during the second period

CNRS as an academic organization has to bridge the gap for its theoretical and applied research results with educational organizations (universities, engineering schools, ...) on one side, and companies on the other side

Dealing with educational schools, CNRS is now contributing in a new educational engineering diploma shared between the main engineering schools in Toulouse (INSA, INP, ENAC, and ISAE) and the University of Toulouse. This new diploma aims at educating students with all security aspects of the digital world. Philippe Owezarski gives a course about the analysis of network traffic in order to detect attacks and anomalies, malicious behaviors, bad configurations, etc. He especially disseminates the results gain in ONTIC on WP4 and Use Case 1 about online traffic analysis and anomaly detection. This new diploma (started in September 2015) is called TLS-SEC (for TouLouSe - SECurity).

Dealing with companies, results gained in ONTIC WP4 and Use Case 1 interested a French Company called BORDER6. BORDER6 aims at proposing network access devices that analyze the inbound and outbound traffic in real time in order to optimize routing path and QoS enforcement for traffic. BORDER6 is strongly interested by our iterative version of the UNADA algorithm (IUNADA) that was proposed in WP4 during second reporting period. They



expect significant performance improvements with this algorithm, as well as the integration of security capabilities as IUNADA is aimed at detecting anomalies and attacks in the traffic. BORDER6 and CNRS signed a research contract in May 2015 for a three year period that aims at adapting IUNADA for BORDER6 devices, adding security functionality, and transferring afterwards the technical skills of CNRS to BORDER6.

5.7 POLITO exploitation activities during the second period

POLITO exploitation plans are to allow the technology and competence transfer to industry, by using ONTIC outcomes to increase awareness among industry and professionals. Furthermore Polito plans to contribute with publications of the scientific results in journals such as IEEE Transactions On Knowledge and Data Engineering and ACM Transactions on Knowledge Discovery, and specific purpose conferences such as IEEE BIG DATA, then use ONTIC as base platform for research on novel Big Data algorithms and data mining techniques in H2020 or national projects (e.g., PRIN), and let students exploit ONTIC activities for completing their Degree Final Project.

Elena Baralis, WP3 leader, has joined the scientific and steering committee of the Master degree in Big Data Engineering by Politecnico di Torino, where most participants come from international companies. The course content has taken advantage from the Big Data experience gained during ONTIC activities, and allowed the Polito team to establish relationships with relevant companies.



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