TNOVA

NETWORK FUNCTIONS AS-A-SERVICE
OVER VIRTUALISED INFRASTRUCTURES

GRANT AGREEMENT NO. 619520

Deliverable D8.33

Final Report on Dissemination and Communication Activities

Editor Panagiotis Papadimitriou (LUH)

Contributors Georgios Gardikis (SPH), Marco Di Girolamo (HPE), Nicolas Herbaut (VIO), Kimon Karras (FINT), George Xilouris, (NCSRD), Evangelos Markakis, Evangelos Pallis (TEIC), Zuccaro L., Liberati F., Cimorelli F., Delli Priscoli F., Pietrabissa A (CRAT).

Version 1.0

Date January 6, 2017

Distribution PUBLIC (PU)

Executive Summary

This report outlines the dissemination activities over the final year of the project as well as the feedback from the external advisory board. The report provides a list of all related activities including publications, presentations, and dissemination through the Internet and social media.

© T-NOVA Consortium

Table of Contents

1. INTRODUCTION 5

2. DISSEMINATION STRATEGY 6

2.1. DISSEMINATION AND COMMUNICATION TOOLS 7
2.2. LIAISONS WITH OTHER PROJECTS 7
2.3. SCIENTIFIC JOURNALS 8
2.4. INTERNATIONAL CONFERENCES 8
2.5. NETWORK OF INTEREST (NOI) 9
2.6. INDIVIDUAL PARTNER DISSEMINATION ACTIVITIES 9
2.7. DISSEMINATION KPIS 11

3. DISSEMINATION AND COMMUNICATION ACTIVITIES DURING THE FINAL PERIOD 12

3.1. PUBLICATIONS IN CONFERENCES AND JOURNALS 12
3.2. DISSEMINATION THROUGH PRESENTATIONS IN VARIOUS EVENTS AND FORA/SDOS 15
3.3. CONFERENCE/WORKSHOP ORGANIZATION 16
3.4. LIAISONS AND COLLABORATION WITH OTHER PROJECTS 17
3.5. DISSEMINATION KPIS 18
3.6. PUBLIC/SOCIAL ACTIVITIES 18
3.6.1. Public Website 18
3.6.2. Social Network Accounts 19
3.7. INTERNAL ACTIVITIES 21
3.7.1. Wiki 21
3.7.2. Mailing Lists 21
3.7.3. Project Meetings 21
3.7.4. Conference Calls 21

4. FEEDBACK FROM THE EXTERNAL ADVISORY BOARD 23

5. CONCLUSION 26

LIST OF ACRONYMS 27

ANNEX 28

Table of Figures

Figure 1: T-NOVA Dissemination 6
Figure 2: T-NOVA dissemination & communication tools 7
Figure 3: T-NOVA Website Google Analytics Stats 19
Figure 4: T-NOVA Website Google Analytics Visitor Location 19
Figure 5: T-NOVA Twitter account 20
Figure 6: T-NOVA LinkedIn account 20

Table of Tables

Table 1: Scientific Journals 8
Table 2: International Conferences 8
Table 3: Partners' Dissemination Plans 9
Table 4: Dissemination KPIs 11
Table 5: T-NOVA papers published or accepted by conferences and journals 12
Table 6: T-NOVA papers submitted to conferences and journals 15
Table 7: Dissemination through presentations 16
Table 8: Achieved Dissemination KPIs 18
Table 9: EAB recommendations and T-NOVA response 23

© T-NOVA Consortium

1. INTRODUCTION

During the course of the project, T-NOVA has given a lot of attention to the dissemination of project results and increasing the visibility of the project. Dissemination and communication has been pursued through the dual avenues of publications/presentations and Internet/social media. These efforts have led to many publications, presentations, demonstrations, and paper submissions (currently under review).

In terms of publications, our primary aim was the quick disseminations of project results. As such, our main publication targets were conferences and workshops, including established venues (e.g., IEEE/ACM COMSNETS, IEEE GLOBECOM) as well as other more focused conferences that rapidly gain reputation, such as IEEE NetSoft and IEEE NFV-SDN. We anticipate more conference/workshop publications in 2017 from papers submitted in the last months.

For journal publications, we mainly considered high profile IEEE Transactions, relevant to scope of the project. Following our success in publishing some of our project results at IEEE Transactions on Network and Service Management (TNSM) in the second year of the project, two additional papers have been submitted to this journal, one of which has been accepted while the other one is considered for publication after a revision. We note that many conference and journal papers are joint publications among several partners. This provides evidence of the collaborations and joint work carried out within the project.

The T-NOVA system and results have been presented at various venues, such as the Mobile World Congress. Furthermore, T-NOVA partners were involved in the organization of conferences and workshops, such as the IEEE INFOCOM Workshop on Software-Driven Flexible and Agile Networking (SWFAN) that took place in San Francisco in April 2016 and IFIP Wired/Wireless Internet Communications (WWIC) conference that took place in Thessaloniki in May 2016. We have took advantage of Internet and social media (*i.e.,* LinkedIn, Twitter, ResearchGate) to further increase the project visibility and establish communication channels with the academic and industrial community.

In the following, we provide an overview of the project dissemination activities during the final year of the project. We further discuss the feedback received from the external advisory board (EAB) and summarize our responses to the suggestions made by the EAB members.

© T-NOVA Consortium

2. DISSEMINATION STRATEGY

Communication and dissemination activities are important enablers in ensuring appropriate visibility and maximising benefits of FP7 funded research to the European scientific community. These activities are focused on generating an effective flow of information and publicity regarding the target objectives, the key project contributions, and the benefits to EU citizens as well as the collaboration on Europe-wide scale.

The T-NOVA dissemination strategy consists of internal and external activities.

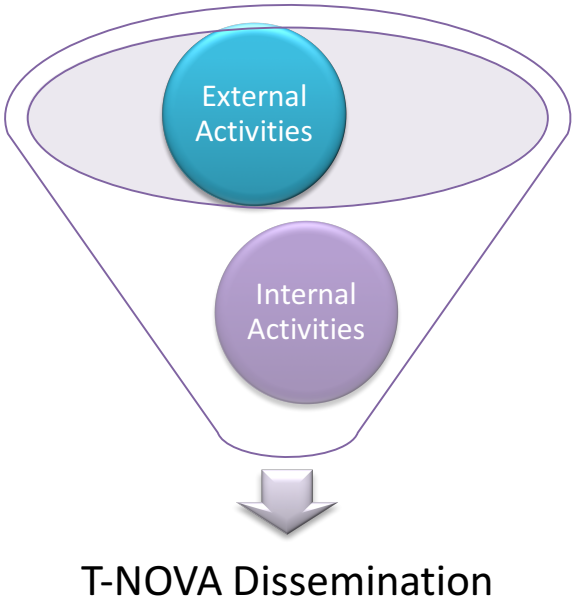

Figure 1: T-NOVA Dissemination

External dissemination is focused on the industrial and academic communities both in Europe and internationally, while spanning across individual researchers, providers, end-users, and stakeholders involved or interested in the T-NOVA concept. External dissemination includes the project's website, scientific publications, project presentations, participation in conferences and organization of events, such as workshops.

Internal dissemination encompasses all the activities carried out between the consortium members. Such activities include mailing lists, plenary and technical meetings, conference calls, online tools, common documentation, and deliverables.

© T-NOVA Consortium

2.1. Dissemination and Communication Tools

The following figure illustrates the dissemination and communication tools which were used to disseminate the project's results.

Figure 2: T-NOVA dissemination & communication tools

2.2. Liaisons with other Projects

Within T-NOVA's plans were the selection of a number of projects with relevant objectives and activities and establish a continuous link with them, in the following areas:

- Bi-lateral discussions between participants of T-NOVA and other projects in order to develop a common understanding of potential synergies.
- Exchange of technical information in order to identify the common areas of R&D for which both T-NOVA and other projects have interest and mutual benefit
- Organisation of joint workshops preferably at the side lines of conferences in areas of mutual interest
- Common participation in conferences/workshops in order to inform the wider scientific community about the key outputs and planned activities of the projects
- Exchange of deliverables
- Providing access to technical results of other projects in order to properly adapt them for the needs of T-NOVA, as well as to tools and results from T-NOVA to other projects
- Participation of T-NOVA consortium members in technical meetings of other projects and vice versa

© T-NOVA Consortium

The consortium identified two EU projects that are thematically relevant to T-NOVA, namely UNIFY and NETIDE. Engagement with these two projects has already been initiated before the official starting date of T-NOVA, under the encouragement of the EC.

2.3. Scientific Journals

The following table provides a list of scientific journals with high impact factor that were set as submission targets for the T-NOVA architecture and results.

Table 1: Scientific Journals

Journal	Publisher	Thematic Area	Journal Information
IEEE Communications Magazine	IEEE	Networking	dl.comsoc.org/ci1/
IEEE Network Magazine	IEEE	Networking	www.comsoc.org/netmag
IEEE Transactions on Network and Service Management	IEEE	Network Management	http://www.comsoc.org/tnsm
Computer Networks	Elsevier	Networking	http://www.journals.elsevier.com/computer-networks/

2.4. International Conferences

A list of international conferences targeted by the T-NOVA consortium is shown below. Several of the targeted conferences (*e.g.,* IEEE INFOCOM, IEEE COMSNETS, IFIP Networking) constitute premier venues for the publication of networking research results.

Table 2: International Conferences

Conference	Type of Audience
IEEE GLOBECOM	Research and Industry
IFIP/IEEE Networking	Research
IEEE COMSNETS	Research
IEEE INFOCOM	Research and Industry
IEEE ICC	Research and Industry
IEEE NFV-SDN	Research and Industry

© T-NOVA Consortium

2.5. Network of Interest (NoI)

The dissemination activities planned in the T-NOVA project aim to foster collaboration opportunities, exchange knowledge, and raise awareness among a large group of stakeholders and players in the NFV and SDN domains.

More specifically, the T-NOVA NoI should include actors from the industry and SMEs. It will be enriched by stakeholders from public bodies, European Commission representatives, press and media organisations, academic and research institutions and other related EU projects. The T-NOVA consortium identified potential collaboration opportunities; promote the T-NOVA project and results while helping to develop synergies between related initiatives in order to expand the project's Network of Interest.

2.6. Individual Partner Dissemination Activities

Besides publications of project results in conferences and journals pursued by all partners, we provide a list of additional planned dissemination activities on a per partner basis:

Table 3: Partners' Dissemination Plans

Activity	Partner
Preparation and submission of technical papers to international scientific journals of high impact factor	ALL
Participation in seminars and workshops	ALL
Dissemination of project results in the annual Summer School in Telecommunications that is organised in its premises	NCSRD
Organisation of workshops in NFV	NCSRD
Internal bulletins, news feeds and internal networking with account managers to ensure awareness of the project and its main innovations as future assets for ATOS	ATOS
External reach to promote innovation and research activity through our corporate website, ARI Booklet and the ATOS' Scientific Community	ATOS
Publication of technical and business white papers at "ATOS Insights & Innovation" and participation in project papers.	ATOS
Internal dissemination within HP, through workshops/presentations, internal website, and newsletter.	HP
Dissemination of results within Portugal Telecom group via internal workshops and technical publications	PTIN

© T-NOVA Consortium

Promotion of T-NOVA results through key public Intel showcase events such as the Intel Developer Forum (IDF) and Research@Intel (US and Europe annual events)	INTEL
Promotion T-NOVA results at industry events such as mobile world congress	INTEL
Promotion of T-NOVA through the PrimeTime magazine (also available online) internal newsletter and the company's website	PTL
Preparation of promotional material such as video and leaflets	PTL
Promotion of T-NOVA through the company's quarterly SpaceTalk magazine and the company's website	SPH
Investigation and communication of the benefits of the T-NOVA solution as a member of the integral Satcom Initiative (ISI) European Technology Platform (http://www.isi-initiative.org)	SPH
Organization of a T-NOVA workshop in Athens, where attendees from local and international enterprises from the telco/networking sector will be invited to see a "hands-on" demonstration of the T-NOVA services and capabilities	SPH
Organization of pilot sites and demonstrations for potential clients	VIO
Campaigns in specialized press, testing websites (CNET, ZDNet, etc.), media shows, social networks buzz through renowned tech experts	VIO
Promotion of T-NOVA in MEF conferences and meetings	CLDST
Promotion of T-NOVA through FINT's website and news releases about project progress and related events	FINT
Promotion of T-NOVA through Italtel website and social networks	ITALTEL
Workshop organisation as part of the TEMU2014/2016 International conference (TCS by IEEE/ComSoc)	TEIC
Promotion of T-NOVA through TEIC's and PASIPHAE's websites, as well as through press releases related to project's activities and results	TEIC
Dissemination and communication of T-NOVA concept and results among students through ERASMUS Life Long Learning activities (e.g. Intensive Programmes, Summer Schools, etc.)	TEIC
Open-source software releases	LUH
Organization of demos/exhibitions of the developed systems	UNIMI
Dissemination of the project results among the regional members of its board	i2CAT

© T-NOVA Consortium

2.7. Dissemination KPIs

The following table summarizes the key performance indicators (KPIs) related to the dissemination activities. The journal publications target has been readjusted to >5, since the initial target of more than 15 journal papers was deemed unrealistic. These KPIs were continuously monitored to ensure the successful accomplishment of the project's dissemination objectives.

Table 4: Dissemination KPIs

KPI	Target
Number of papers published in international refereed journals	> 5
Number of papers presented in international conferences	> 30
Number of demonstrations in exhibitions and other events	> 6
Number of workshops/meetings with liaised projects (UNIFY, NETIDE)	4

© T-NOVA Consortium

3. Dissemination and Communication activities during the Final period

3.1. Publications in Conferences and Journals

Conferences, workshops, and journals are the main targets for the dissemination of scientific knowledge gained throughout the project. As such, T-NOVA has been actively seeking the publication of project results in reputable international conferences and scientific journals. Tables 5 and 6 show the papers published, accepted or submitted to conferences, workshops, and journals during the third year of the project. Among the 19 publications (listed in Table 5), 9 papers were jointly co-authored by more than one partners, corroborating the strong collaborations established during the course of the project. Furthermore, one paper (SDN-based Source Routing for Scalable Service Chaining in Datacenters) received the Runner-up Best Paper Award at the WWIC conference.

Table 5: T-NOVA papers published or accepted by conferences and journals

Authors	Title / DOI	Journal/ Conference	Status	Partners
A. Abujoda and P. Papadimitriou	DistNSE: Distributed Network Service Embedding Across Multiple Providers 10.1109/COMSNETS.2016.7439948	8th IEEE International Conference on Communication Systems and Networks (COMSNETS) 2016	Published	LUH
Z. Cao, A. Abujoda, and P. Papadimitriou	Distributed Data Deluge (D3): Efficient State Management for Virtualized Network Functions 10.1109/INFCOMW.2016.7562183	IEEE INFOCOM Workshop on Software-Driven Flexible and Agile Networking (SWFAN) 2016	Published	LUH
A. Abujoda, H. Kouchaksaraei, P. Papadimitriou	SDN-based Source Routing for Scalable Service Chaining in Datacenters (**Runner-Up Best Paper Award**) 10.1007/978-3-319-33936-8_6	14th IFIP International Conference on Wired & Wireless Internet Communications (WWIC) 2016	Published	LUH
P. Comi, P. Crosta, M. Beccari, P. Paglierani, G. Grossi, F. Pedersini, A. Petrini	Hardware-accelerated High-resolution Video Coding in Virtual Network Functions 10.1109/EuCNC.2016.7560999	European Conference on Networks and Communications (EUCNC) 2016	Published	ITALTEL, UNIMI

F. Cimorelli, F. Delli Priscoli, A. Pietrabissa, L. Ricciardi Celsi, V. Suraci, L. Zuccaro	Distributed Load Balancing Algorithm for the Control Plane in Software Defined Networking 10.1109/MED.2016.7535946	24th IEEE Mediterranean Conference on Control and Automation (MED) 2016	Published	CRAT
P. Paglierani, G. Grossi, F. Pedersini, A. Petrini	GPU-based VP8 Encoding: Performance in Native and Virtualized Environments 10.1109/TEMU.2016.7551915	International Conference on Telecommunications and Multimedia (TEMU) 2016	Published	ITALTEL, UNIMI
N. Herbaut, D. Negru, Y. C. Pantelis, A. Frangoudis, A. Ksentini	Content Delivery Networks as a Virtual Network Function: a win-win ISP-CDN collaboration	IEEE Global Communications Conference (GLOBECOM) 2016	Published	VIO
G. Gardikis, I. Koutras, G. Mavroudis, S. Costicoglou, G. Xilouris, C. Sakkas, A. Kourtis	An Integrating Framework for Efficient NFV Monitoring 10.1109/NETSOFT.2016.7502431	IEEE Conference on Network Softwarization (NetSoft) 2016	Published	SPH, NCSRD
J. Rierra, et al.	TeNOR: Steps Towards an Orchestration Platform for Multi-PoP NFV Deployment 10.1109/NETSOFT.2016.7502419	IEEE Conference on Network Softwarization (NetSoft) 2016	Published	I2CAT, PTIN, INTEL, CRAT, UNIMI, LUH, ATOS, NCSRD, TEIC
V. Riccobene, M. J. McGrath, M. A. Kourtis, G. Xilouris, H. Koumaras	Automated Generation of VNF Deployment Rules Using Infrastructure Affinity Characterization 10.1109/NETSOFT.2016.7502417	IEEE Conference on Network Softwarization (NetSoft) 2016	Published	INTEL, NCSRD
G. Xilouris, M.A. Kourtis, G. Gardikis, I. Koutras	Statistical-based Anomaly Detection for NFV Services	IEEE NFV-SDN 2016	Published	NCSRD, SPH
E. Markakis, A. Sideris, G. Alexiou, A. Bourdena, E. Pallis, G. Mastorakis, C. Mavromoustakis	A virtual network functions brokering mechanism	IEEE International Conference in Telecommunications and Multimedia (TEMU) 2016	Published	TEIC

D. Dietrich, C. Papagianni, P. Papadimitriou, J. Baras	Network Function Placement on Virtualized Cellular Cores	9th IEEE International Conference on Communication Systems and Networks (COMSNETS) 2017	Accepted	LUH
K. Karras, O. Kipouridis, N. Zotos, E. Markakis, G. Bogdos	A Cloud Acceleration Platform for Edge and Cloud	Energy-efficient Servers for Cloud and Edge Computing Workshop (ENeSCE) 2017	Accepted	FINT, TEIC
A. Pietrabissa, F. Delli Priscoli, A. Di Giorgio, A. Giuseppi, M. Panfili, V. Suraci	An Approximate Dynamic Programming Approach to Resource Management in Multi-Cloud Scenarios 10.1080/00207179.2016.1185802	International Journal of Control, Taylor & Francis, 2016	Published	CRAT
Y. Rebahi, M. S. Ghamsi, N. Herbaut, D. Negru, P. M. Comi, P. S. Crosta, P. Lorenz, E. Pallis, E. Markakis	Virtual Network Functions Deployment between Business Expectations and Technical Challenges: The T-NOVA Approach 10.2174/2215081105666160929123813	Journal of Recent Advances in Communications and Networking Technology, 5(1), 2016	Published	FOCUS, VIO, ITALTEL, TEIC
M.A. Kourtis , H. Koumaras, L. Fidel	Reduced-Reference Video Quality Assessment using a Static Video Pattern 10.1117/1.JEI.25.4.043011	SPIE Journal of Electronic Imaging	Published	NCSRD
D. Dietrich, A. Abujoda, A. Rizk, P. Papadimitriou	Multi-Provider Service Chain Embedding with Nestor 10.1109/TNSM.2017.2654681	IEEE Transactions on Network and Service Management, 2017	Accepted	LUH
I. Trajkovska, et al.	SDN-based Service Function Chaining Mechanism and Service Prototype Implementation in NFV scenario	Journal of Computer Standards & Interfaces	Accepted	ZHAW, NCSRD

The following Table (Table 6) is presenting papers that have been submitted and are in the review process.

Table 6: T-NOVA papers submitted to conferences and journals

Authors	Title	Journal/Conference	Partners
A. Kourtis, et al.	T-NOVA: An Open-source MANO Stack for NFV Infrastructures (under major revision)	IEEE Transactions on Network and Service Management	NCSRD, INTEL, SPH, I2CAT, CRAT, UNIMI, LUH, ATOS, PTIN
N. Herbaut, D. Negru, D. Dietrich, P. Papadimitriou	Service Chain Modeling and Embedding for NFV-based Content Delivery	IEEE International Conference on Communications (ICC) 2017	VIO, LUH
N. Herbaut, D. Negru, D. Dietrich, P. Papadimitriou	Dynamic deployment and optimization of virtual content delivery networks (under minor revision)	IEEE Multimedia Magazine	VIO, LUH
M. Skoviera, O. Serhiienko, P. Harsh, M. P. Belmonte, T. M. Bohnert	Cyclops: Performant Billing	CCGrid 2017	ZHAW
F. Liberati, A. Giuseppi, A. Pietrabissa, V. Suraci, A. Di Giorgio, M. Trubian, D. Dietrich, P. Papadimitriou, F. Delli Priscoli,	Stochastic and Exact Methods for Service Mapping in Virtualized Network Infrastructures	International Journal of Network Management, Wiley	CRAT, UNIMI, LUH

3.2. Dissemination through Presentations in various events and fora/SDOs

Besides conference paper presentations, the T-NOVA orchestrator and other project results were presented at the events shown below.

© T-NOVA Consortium

Table 7: Dissemination through presentations

Event	Location	Date
Mobile World Congress	Barcelona, Spain	February 2016
6th SDN Workshop (co-located with OpenCloudDay)	Zurich, Switzerland	June 2016
OpenStack Day 2016	Budapest, Hungary	June 2016
EuCNC Workshop on NFV and Programmable Software Networks	Athens, Greece	June 2016
Digital Infrastructures for Research (Di4R)	Krakow, Poland	September 2016
7th SDN Workshop	Zurich, Switzerland	December 2016
SDN & Openflow World Congress 2016	The Hague, Nederlands	October 2016

In addition to the above table, the T-NOVA partners have further carried out the following dissemination activities:

- VIO presented T-NOVA to IRISA*/INRIA* Rennes-Bretagne Atlantique in January 2016.
- VIO presented a T-NOVA demo" Deploying a Content Delivery Service Function Chain on an SDN-NFV Operator Infrastructure" at the TEMU conference in July 2016.
- VIO presented T-NOVA and their work at the CNRS Research group for networks and distributed Systems - Cloud Days 2016 in September 2016 (http://cloud-days16.i3s.unice.fr/).
- VIO gave a presentation of T-NOVA at University College of Dublin, School of Computer Science, in November 2016.
- LUH presented their T-NOVA work at the Mobile Multimedia Lab of Athens University of Economics and Business in January 2016.
- LUH presented their T-NOVA work at the Computer Networks Group of Paderborn University in March 2016.

3.3. Conference/Workshop Organization

T-NOVA partners have been involved in the organization and chairing of the following NFV-related events:

- T-NOVA Workshop on Network Function Virtualisation (NFV) and Programmable Software Networks, endorsed by the Software Networks Working Group of the 5G-PPP (https://5g-ppp.eu/) and Future Internet Cluster.
- IEEE INFOCOM Workshop on Software-Driven Flexible and Agile Networking (SWFAN), San Francisco, USA, April 2016, http://swfan.org/2016/

- 14th IFIP International Conference on Wired/Wireless Internet Communications (WWIC)

The SWFAN workshop was a full-day event consisted of presentations of peer-reviewed papers on NFV/SDN plus two keynote talks delivered by renowned experts on network processing and NFV. In particular, speakers presented research results and shared their views on topics, such as programmability, NF placement, caching, flexible resource management, and fault management. The workshop had very high attendance and was held in a very interactive atmosphere, with most talks stimulating interesting discussions.

WWIC was three-day event with broader scope (i.e., architectures and protocols for wired/wireless networks), consisting of three keynotes and 27 paper presentations, all held within a single track. One of the keynotes was related to the MCN project, whereas a T-NOVA partner presented projects results on NF state management (the T-NOVA paper received the runner-up best paper award).

3.4. Liaisons and collaboration with other projects

Over the final year of the project, the following discussions and liaisons with other projects took place:

- **H2020 5GEx:** T-NOVA and 5GEx have been in early touch, both through direct interactions and by leveraging the presence of common project partners. T-NOVA has shared with 5GEx its developed technology, and in particular has made available its Marketplace component, which has been significantly leveraged by 5GEx to design and implement its akin customer front-end component.

- **H2020 VINEYARD:** FINT presented its T-NOVA developed Programmable Cloud Platform (PCP) to the members of the VINEYARD project, which aims at building an integrated platform for energy-efficient data centres based on novel programmable hardware accelerators (Dataflow engines and FPGA-based servers). The VINEYARD project technical manager presented their work and discussions ensued on how they could leverage (PCP) results in their platform. During these discussions significant alignment was determined and it was decided to follow up by participating at the Enesce 2017 workshop which is organized by the VINEYARD project in January 2017.

© T-NOVA Consortium

3.5. Dissemination KPIs

This section outlines the dissemination and communication activities carried out during the three years of the project. The following table summarizes the achieved key performance indicators (KPIs), as compared to the planned ones. Reaching the end of the project, our KPIs have been mostly met (with the exception of the journal publication KPI). Given that the outcome of several submissions is still pending (especially journal paper submissions), we expect additional publications from the project in the following weeks or months. In particular, two of our submitted journal papers (to IEEE TNSM and the Journal of Computer Standards & Interfaces) have advanced to the second round of reviews, and as such, are likely to be accepted for publication (resulting in 7 journal publications overall, hence meeting the respective KPI).

Table 8: Achieved Dissemination KPIs

KPI	Target	Current
Number of papers published in international refereed journals	> 5	7
Number of papers presented in international conferences	> 30	31
Number of demonstrations in exhibitions and other events	> 6	8
Number of workshops/meetings with liaised projects (UNIFY, NETIDE)	4	6

3.6. Public/Social Activities

3.6.1. Public Website

A public website for T-NOVA was set up at the beginning of the project (January 2014) and will be available after the end of the project. The website is regularly updated with project-related activities, project public deliverables and project news.

The T-NOVA website is accessible online at http://www.t-nova.eu. We have added the Google Analytics tracking code in the template of T-NOVA website, enabling the tracking of statistics of the project's website. The number of sessions and other key statistics are shown in Figures 3-4.

© T-NOVA Consortium

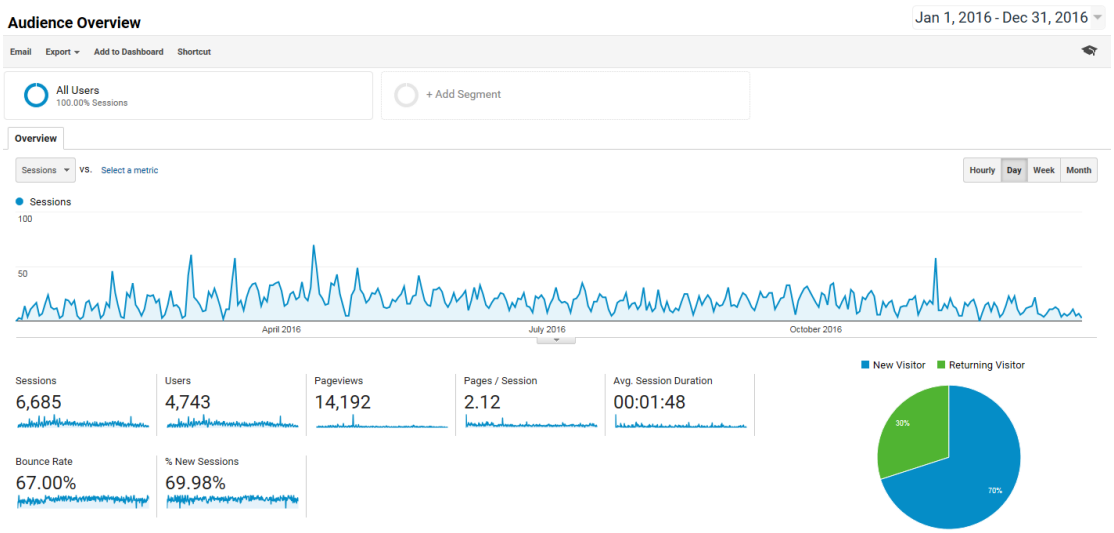

Figure 3: T-NOVA Website Google Analytics Stats

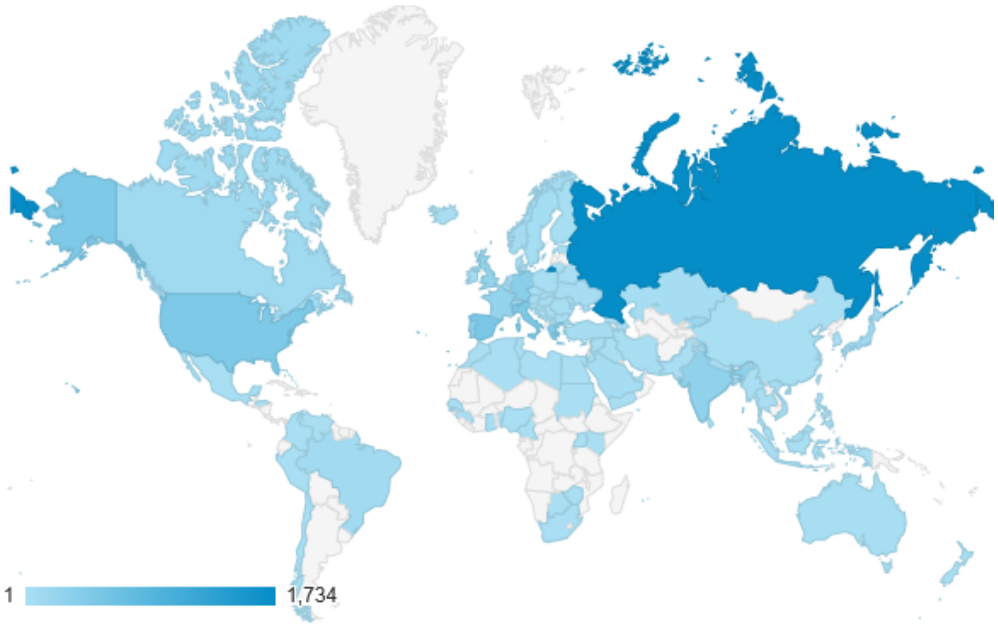

Figure 4: T-NOVA Website Google Analytics Visitor Location

3.6.2. Social Network Accounts

Apart from the public website, we have created social network accounts on Twitter, LinkedIn, Slideshare, and ResearchGate to increase the visibility of the project.

3.6.2.1. Twitter

We have created an account on Twitter in order to explore this as a conversational channel by posting live events and news about the project. The T-NOVA account

@FP7TNOVA has been active since January 2014 and currently has 203 followers, as shown in Figure 5.

Figure 5: T-NOVA Twitter account

3.6.2.2. LinkedIn

A group on LinkedIn was established in September 2014 with the objective of sharing news from T-NOVA, attracting the attention of researchers, practitioners, and stakeholders involved or interested in the thematic areas of T-NOVA. The LinkedIn group is available at: https://www.linkedin.com/groups/FP7-TNOVA-6760388

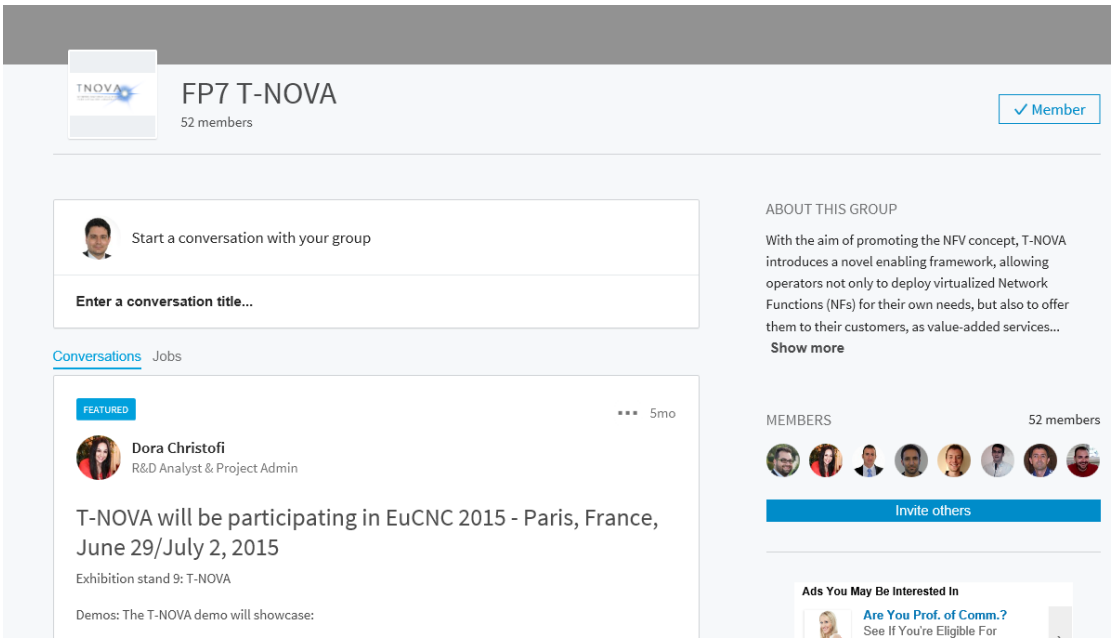

Figure 6: T-NOVA LinkedIn account

3.6.2.3. Slideshare

A Slideshare account has been set up to publish presentations and documentation of T-NOVA, in addition to the project website. The Slideshare account has been active since September 2014 and is accessible at: http://www.slideshare.net/fp7tnova

3.6.2.4. ResearchGate

A ResearchGate account was recently set up to share papers, presentations, and other technical documents of the project with researchers, technologists, scientists, and students working on NFV orchestration aspects.

3.7. Internal Activities

3.7.1. Wiki

A Wiki has been set up based on the open-source MediaWiki platform [1] to support daily communication between the project participants. The T-NOVA wiki page has promoted efficiency the centralised management of project tasks and activities among the partners.

3.7.2. Mailing Lists

In addition to Wiki, a general T-NOVA mailing list as well as a mailing list for each work package have been setup in order to communicate information within the consortium. All mailing lists have been created using the open-source GNU Mailman software [2].

3.7.3. Project Meetings

The T-NOVA consortium organized face-to-face project meetings, including 3 plenary meetings, 2 technical meetings during the third year of the project:

- Plenary Meeting in Athens, Greece – February 2016
- Technical (WP7) Meeting in Athens, Greece – February 2016
- Plenary Meeting in Chania, Greece – July 2016
- Technical (WP7) Meeting in Aveiro, Portugal - September 2016
- Plenary Meeting in Dublin, Ireland – November 2016

3.7.4. Conference Calls

The Work package leaders organized a weekly or bi-weekly conference call for each task in the project. Minutes and actions defined during the conference calls are

© T-NOVA Consortium

recorded on the wiki to ensure that all partners are appropriately informed if unable to participate in a call. In addition, these meeting minutes act as record of decisions made among the participants. The conference calls are also used by partners to provide presentations of enabling technologies and/or their ongoing research work.

© T-NOVA Consortium

4. Feedback From The External Advisory Board

From the early phases of the project, T-NOVA engaged an External Advisory Board (EAB), with appointed advisors external to the project team, in order to better align the orientation and technical goals of the project with the market trends and needs.

The T-NOVA External Advisory Board involves distinctive members of the Industry and Research community covering areas where T-NOVA is mostly interested in having the maximum impact. The role of the EAB is to provide its scientific expertise, market knowledge and insight on market trends as a feedback to the project, in order to affect in a constructive way major strategic decisions.

The T-NOVA EAB was currently composed of the following members (in alphabetical order):

- Dr. Gonzalo Camarillo, Standardisation Director, Ericsson
- Dr. Shahar Steiff, AVP – Business Operations, PCCW Global, Member of the BoD of Metro Ethernet Forum
- Dr. Steven Wright, AT&T NFV & SDN Industry Engagement, former ETSI ISG NFV Chairman

EAB members were invited and were physically present in some of the project General Assembly meetings, in GA2 (Aveiro), GA3 (Palermo), GA4 (Milan), GA6 (Limassol). In each of the above-mentioned GA meetings, a specific slot in the agenda was dedicated to the interaction with the EAB.

The table below summarises the main comments/recommendations from the EAB, as they were recorded during the meetings, and describes the corresponding response from the T-NOVA consortium.

Table 9: EAB recommendations and T-NOVA response

EAB comment/ recommendation	T-NOVA response
Inter-domain operation is a recommended extension for future research.	T-NOVA did not include multi-domain aspects in its scope, however these are recognized as a future research topic and are already tackled by some 5G projects (e.g. 5GEx)
Security is a crucial issue especially in the cloud domain (particularly Linux containers)	Security was one of the main reasons why T-NOVA decided to implement the VNFs based on Virtual Machines rather than Containers.
The Marketplace is an original aspect of the project and also the key differentiator to the ongoing endeavours, thus it deserves special attention.	Most of the demos of T-NOVA used the Marketplace as the main visual element (also for interacting with the audience), so that this aspect of T-NOVA is well stressed. The Marketplace aspect was also promoted

© T-NOVA Consortium

	extensively in the project dissemination and standardization campaign.
Usage-based accounting and billing is the recommended approach (compared to flat-rate billing)	T-NOVA paid specific attention to integrating and adapting accounting/billing frameworks such as Cyclops, in order to implement usage-based charging.
Some deliverables seem too long, there should be some indicator to redirect the reader to the useful parts.	Especially during Y2 and Y3, specific attention was paid to the length of the deliverables and in particular to the Executive Summary section, in order to highlight the most important aspects of the document.
OPNFV is progressing and the project should try to influence it, rather than duplicating work. It is an opportunity to get involved at the early stages of the project.	T-NOVA followed OPNFV closely, the NFVI implementation is totally compatible with OPNFV, and a focused contribution of T-NOVA to OPNFV was also produced (Yardstick).
An eye must be kept on ONOS, although it currently lags.	ONOS was always included in the technology watch during the course of the project, although T-NOVA eventually built on OpenDaylight (which was also OPNFV choice).
The core objective would be to maximise the impact of the project.	In this direction, the project team decided to focus on demos/exhibitions even from the first year of the project, as well as to release almost all modules as open-source on Github (although this was not foreseen in the DoW)
The connectivity component is very important and is not adequately covered by ETSI	In order to emphasize the importance of the connectivity component, T-NOVA paid specific attention to the implementation of the WICM (a module not initially foreseen in the DoW)
The SFC-related technical problems are mostly tied to Openstack and not directly of interest to ETSI NFV.	The SFC module developed in T-NOVA (netfloc) was mostly based on Openflow, in order not to be too tightly coupled with Openstack. It was not eventually considered as candidate for standardization.
It is interesting to set testing/validation criteria for accepting/certifying a VNF to the Marketplace	Although specific criteria were not met, D5.32 structure was modified to also contain specific directions –as well as lessons learnt- for VNF developers, in order to be able to produce T-NOVA-compliant VNFs.

It is advised that future multi-domain extensions to T-NOVA should follow the cascaded model for multi-domain operation, rather than the centralised broker approach.	This will be considered in future research based on T-NOVA tackling multi-domain aspects (which were not in T-NOVA scope)
Even within a single carrier, in a big carrier scenario it is difficult to imagine a single Orchestrator managing everything.	This is a valid comment and future extensions of T-NOVA should consider adapting TeNOR in order to support a distributed architecture.

5. CONCLUSION

This deliverable outlined the T-NOVA dissemination strategy and the dissemination activities for the third year of the project. The deliverable provides a detailed description of the activities both internally and externally undertaken in order to increase the project's visibility and its research output. Alongside the dissemination activities, in this deliverable we further present the feedback received from EAB and our responses to the suggestions made by EAB members.

In the third year, T-NOVA followed the dissemination strategy for this period, i.e., to publish T-NOVA system- and component-level evaluation results in reputable conferences and journals, as well as to give presentations and demonstrations in high-profile NFV-related venues attended by industry and researchers. Dissemination highlights include a journal paper accepted in IEEE Transactions on Network and Service Management and conference papers at IEEE/ACM COMSNETS, IEEE GLOBECOM, IEEE NetSoft, and IEEE NFV-SDN, as well as T-NOVA orchestrator demonstrations at premier venues such as MWC 2016. Furthermore, the T-NOVA partners have been active in workshop organization and chairing, such as IEEE INFOCOM SWFAN in San Francisco, and IFIP WWIC 2016 in Thessaloniki.

In terms of dissemination KPIs, our targets have been met, while several additional conference and journal paper submissions are still under review. As such, we anticipate an even larger number of publications, exceeding our goals in each dissemination category.

© T-NOVA Consortium

LIST OF ACRONYMS

Acronym	Description
ACM	Association for Computing Machinery
API	Application programming interface
F2F	Face to Face
EAB	External Advisory Board
FIA	Future Internet Assembly
EU	European Union
FP7	7th Framework
IEEE	Institute of Electrical and Electronics Engineers
IFIP	International Information Security and Privacy
IRTF	Internet Research Task Force
KPI	Key Performance Indicators
NFV	Network Functions Virtualization
SDN	Software Defined Network

© T-NOVA Consortium

ANNEX

[1] MediaWiki, https://www.mediawiki.org/wiki/MediaWiki

[2] GNU Mailman Software, http://www.gnu.org/software/mailman/

© T-NOVA Consortium