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Secured autonomic traffic management for a Tera of SDN flows

D6.1: Dissemination, Communication, Collaboration and Standardisation Plan

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Work package	WP6

Abstract

This deliverable presents the communication and dissemination strategy defined for the TeraFlow project considering the key audiences which will be targeted and reached using a wide array of communication and dissemination activities. The strategy has been set considering the general objectives of the project and the accomplishment of specific objectives in terms of dissemination and communications. From that, a three-phased strategy has been defined considering the expected workplan and outcomes of the project. This strategy will be supported by the execution of various tactics and the set-up of communication channels such as project website, social media, communication material, scientific publications, newsletters, press releases, blog posts, and events. Moreover, it presents the standards and open source contributions that will be addressed by TeraFlow, also considering the active liaison with other projects, related communities, and 5G-PPP.

The strategy presented will be updated if needed to achieve the objectives and KPIs set. Any modifications shall be included in upcoming deliverables along with the report of activities executed in each period in D6.2 “Market and business opportunities analysis and intermediate report on

Dissemination, Communication, Collaboration, and Standardisation" (M12) and D6.4 "Final Report on Dissemination, Communication, Collaboration, Standardisation and Exploitation" (M30).

Disclaimer

Acknowledgment

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[1] http://creativecommons.org/licenses/by-nc-nd/3.0/deed.en_US

EXECUTIVE SUMMARY

This deliverable presents a comprehensive strategy for TeraFlow communication and dissemination activities that will be executed within WP6, "Standardisation, dissemination, and exploitation," to support the sustainability, commercialisation, and further use of the project results, while also raising awareness and giving visibility about the motivation behind the project and the objectives that will be achieved during the 30 month duration of the project.

D6.1 presents the main principles defined by T6.1, "Stakeholder engagement, communication and dissemination," led by ATOS, to build a strong and solid strategy starting from the identification of key target audiences considering their potential interest and relation with the project and its results, and then the definition of phases and messages to be addressed taking into account the technical development within other Work Packages.

For this purpose, a three-phase strategy has been defined and will be reflected in all the messages and activities executed. In 2021, Phase 1 will focus on raising awareness about the project, its motivation, the objectives, consortium, expected outcomes, and other topics relevant to set the pace for the upcoming phases supported by the availability of technical results. With the release of v1 of TeraFlow OS, Phase 2 will strive from January 2022 until December 2022 to inform key target audiences about the progress of the project and actively engage with them in different venues to support the validation of both, technical and business concepts. The last six months of the project will be devoted to Phase 3 aiming to promote the uptake of TeraFlow results among potential end-users and early adopters with more commercial-oriented activities and material developed.

The channels and tactics that will be used to reach target audiences are:

- Project Website
- Social Media accounts (Twitter, LinkedIn, and YouTube)
- Communication Material
- Journal Publications and Scientific Papers
- Content Strategy (Press Releases, Newsletters, Blog Posts)
- Events and workshops

Moreover, the dissemination and communication activities will be tightly related to the work planned within T6.2 "Standardisation and open source software activities" led by TID and T6.4 "Liaison activities and 5G-PPP collaboration" led by CTTC, since these two tasks will strive throughout the project to build strong relationships with external communities, hence raising awareness about the project and promoting the uptake of the results developed within TeraFlow.

Relevant Key Performance Indicators (KPIs) have been set to evaluate the success of the strategy. In order to achieve timely identification of any deviations, the team behind T6.1 will monitor monthly the activities and objectives to be reached. Any changes or adjustments to the plan presented in the deliverable will be reported on upcoming deliverables at M12 and M30 together with the corresponding report of activities executed at each reporting period.

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Abbreviations

5G-PPP	5G Infrastructure Public Private Partnership
AI	Artificial Intelligence
B5G	Beyond 5G
MEC	Mobile Edge Computing
ML	Machine Learning
NFV	Network Functions Virtualisation
SDN	Software Defined Networking
SEO	Search Engine Optimization
WP	Work Package

1. Introduction

TeraFlow aims to create a novel cloud-native SDN controller for Beyond 5G (B5G) Networks able to integrate with current NFV and MEC frameworks while also providing revolutionary features for flow aggregation, management, network equipment integration, and AI/ML-based security and forensic evidence for multi-tenancy. The strong and innovative technological aim that TeraFlow has, must be reinforced, and strengthened through engagement with potential user groups and relevant stakeholders. For the latter, it is essential to raise awareness about the activities, progress, and developments of TeraFlow among the key audiences and give visibility to TeraFlow results and validation scenarios within broader community and relevant stakeholders.

Moreover, due to TeraFlow's nature as one of the 5G-PPP projects, the continuous relation with this ecosystem, other projects that are part of it, as well as with relevant standardisation bodies, is fundamental to ensure wide industry adoption of the project outcomes while at the same time contributing to the dissemination of the project concepts and results.

The activities described in this document are some of the various purposes of WP6 (Standardisation, Dissemination and Exploitation) which works on the definition and implementation of a strategy to successfully achieve sustainability of TeraFlow results, their commercialisation, and implementation by external end-users.

This document presents the plans defined for dissemination, communication, standardisation, and collaboration with the 5G-PPP. These plans are the reflection of the work and activity of the following tasks:

- T6.1 – Stakeholder engagement, communication, and dissemination
- T6.2 – Standardisation and open source software activities
- T6.4 – Liaison activities and 5G-PPP collaboration

The activities set up as part of the plans defined in this deliverable will be reported in upcoming deliverables:

- D6.2 – Market and business opportunities analysis and intermediate report on Dissemination, Communication, Collaboration and Standardisation - December 2021 (M12)
- D6.4 – Final Report on Dissemination, Communication, Collaboration, Standardisation and Exploitation - June 2023 (M30).

1.1. Purpose and Objectives

The purpose of this deliverable is to present the plans and expected activities to be executed throughout the project's life to meet the following objectives described in the Description of Action:

- Achieve maximum visibility and raise awareness of the project among the full range of stakeholders.
- Provide a significant impact on standardisation and open source contributions.
- Seek collaboration within the 5G-PPP framework and find synergies between stakeholders towards maximising the impact of TeraFlow.

To do so, the plans presented in this document consider a clear strategy for each broad group of activities, define the roles of the partners participating in the three tasks, and last but not least, set the methodology for the evaluation and monitoring of the activities defined.

In addition, as a way to present the commitment of partners to the activities of T6.1 and since the whole consortium has allocated effort on this task, updated versions of the individual dissemination and communication plans of each partner are presented in this document. The plans describe how the partners will actively contribute to the dissemination and communication activities considering their role within the project and areas of expertise, among other factors.

1.2. Structure of the Document

This deliverable is divided into three main thematic areas considering the three tasks involved (T6.1, T6.2, and T6.4) as follows:

- Section 2 presents the communication and dissemination strategy from the definition of specific objectives, identification of key target audiences, phases, and messages, to the detailed description of each of the channels and tactics considered to maximise the impact of TeraFlow. This section also presents specific KPIs that will be constantly monitored to evaluate the success of the strategy and activities. Finally, Section 2 presents the Individual Dissemination and Communication plans of TeraFlow partners.
- Section 3 focuses on presenting the standardisation and open-source activity plan, including identifying key areas of interest to maximise efficiency and keep track of all partners' contribution depending on their role and involvement in these types of activities.
- Section 4 describes how TeraFlow will interact with the 5G-PPP Working Groups to align its activities with the common framework while enabling cooperation and commitment to join activities for greater impact.
- Section 5 presents conclusions and upcoming activities to be executed in the short term.

Further project deliverables will review the initial plans described in this deliverable if some adjustments have to be made to achieve the KPIs and objectives. Hence, D6.2 and D6.4 will follow a similar structure and report on the specific activities performed by TeraFlow on dissemination, communication, standardisation, and liaison with 5G-PPP.

2. Communication and Dissemination Strategy

2.1. Communication Impact

Communication and dissemination actives are of utmost importance to support and maximise the impact TeraFlow wishes to make for various stakeholders and contribute to the growth of the Competitive European Economic by generating new market opportunities. Therefore, the communication and dissemination tactics need to be carefully defined to raise awareness and ensure maximum visibility of project motivation, results, and progress among stakeholders and key audiences.

At the start of the project, it is essential to clearly define what is dissemination and what is communication to build a strong strategy considering these two different concepts in a complementary manner:

- **Dissemination:** the public disclosure of the results of the project in any medium. It involves a promotion and awareness-raising process from the beginning of the project to make research results known to various stakeholder groups such as research peers, industry, potential end-users, policymakers, etc, in a targeted way. It also considers enabling these groups to use the results in their work.
- **Communication:** the promotion of the action itself and its results to many audiences, including the media and the public, considering engagement for building strong relationships with 3rd parties. By defining communication actions, it is possible to reach out to society as a whole and specific audiences to demonstrate how EU funding contributes to tackling societal challenges.

Based on those definitions and information available in the "Quick guide and tools for Communication, Dissemination and Exploitation in Horizon 2020"[2], we have categorised the channels, activities, and tactics that will be executed throughout TeraFlow's life. Please note that some of they may support both communication and dissemination purposes:

- **Dissemination tactics and activities:** Publication of scientific papers at journals and conferences, development of technical posters, participation in events, live and /or recorded demonstrations of the technical results, and technical blog posts.
- **Communication tactics and activities:** Set-up, management, and update of website and social media accounts; development of communication and marketing material such as brochures, infographics, and videos; press releases and publication of project information on partners' websites and various media outlets; participation in events; non-technical blog posts; and newsletters.

The dissemination and communication tactics are described in detail on Section 2.5 of this deliverable.

Independent of the tactics, the definition of the brand and visual elements of TeraFlow has a great impact on the execution of various activities as the idea is to share a consistent and coherent image of the project regardless of the activity, venue, partner participating, etc. The following subsection presents the most important branding elements of TeraFlow.

[2] (European Commission, 2021)

2.1.1. Branding

The branding of TeraFlow has been built considering the definition of a clear personality which helps to reach the emotional side of key audiences through visual elements such as the project logo, font, colours, imagery, etc.

To facilitate the use of the correct branding by all partners during the various dissemination and communication activities, the dissemination team has developed a Brandbook and Dissemination/Communication Guidelines consisting of instructions on how to appropriately use the TeraFlow branding, and a summary of the main actions that need to be carried out.

Simultaneously, these guidelines aim to provide all the relevant information in a single document that will be updated along with the creation of more dissemination materials, or specific activities, as it contains direct links to documents and material available on the project repository.

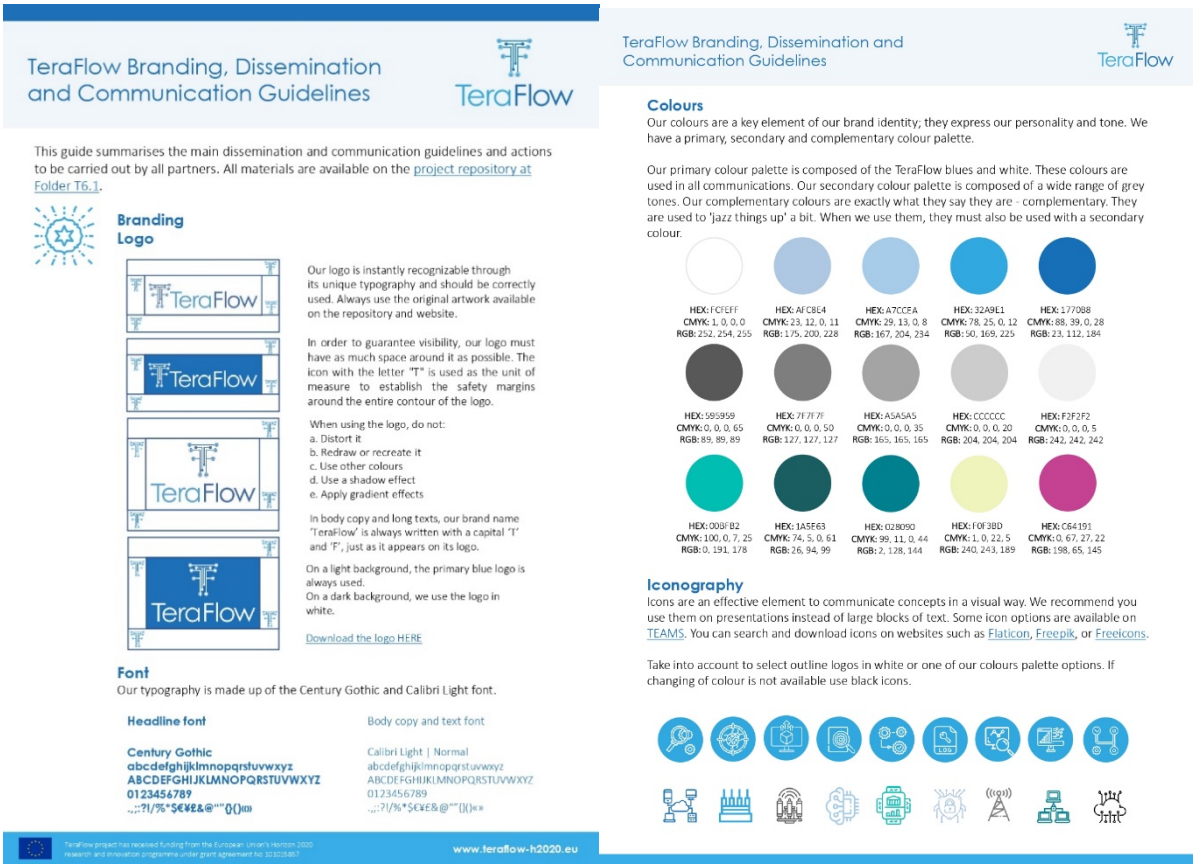

Figure 1: Branding, Dissemination and Communication Guidelines - Page 1-2

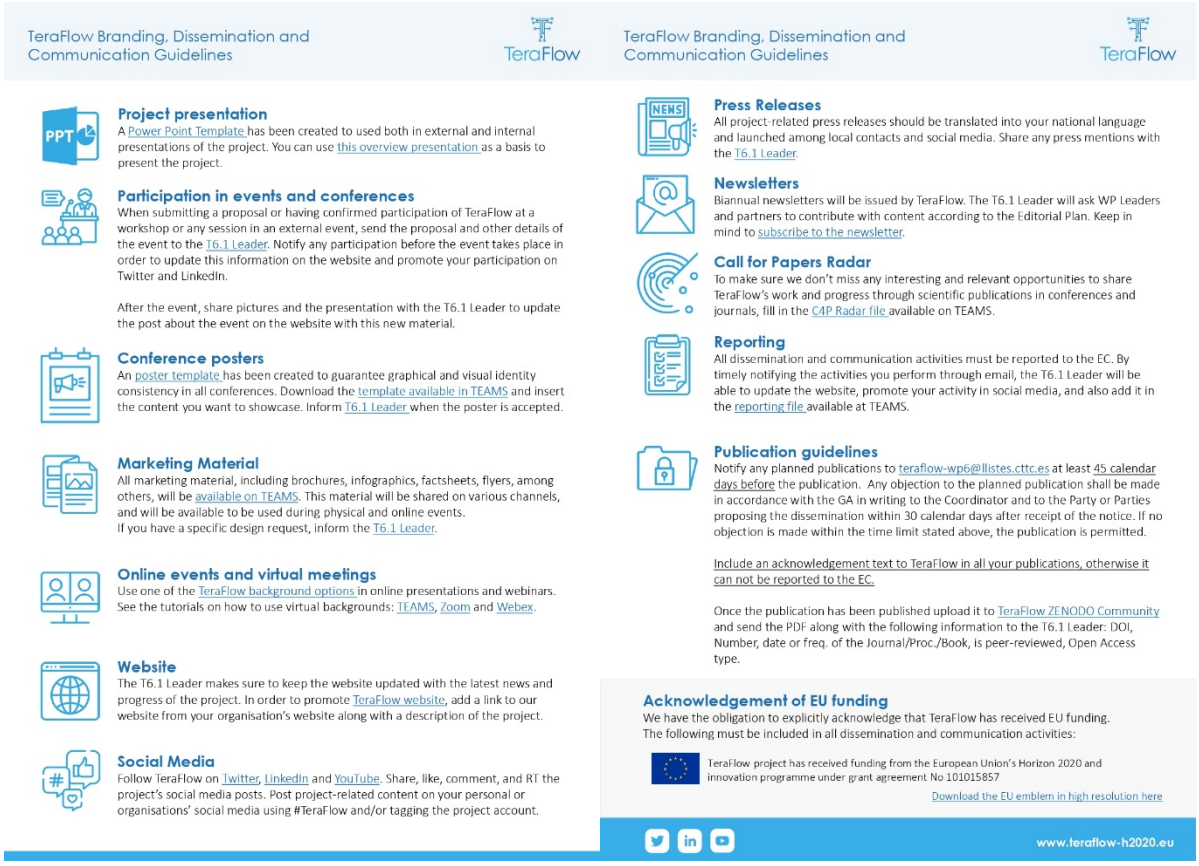

Figure 2: Branding, Dissemination and Communication Guidelines - Page 3-4

2.1.1.1. Logo

The logo was inspired by the "Tera of SDN flows" the project aims to manage, and which is part of its tagline. The icon expresses the different flows and nodes in the shape of a "T" and can be used separately from the word TeraFlow if the complete logo unnecessary or there is the need to evoke the project. The colours chosen for the logo are two different shades of blue, and the selection of them is based on the *Colour Psychology* and the emotions blue reflects such as calmness, secure, stable, reliable, inspiring, and most important of all, innovation.

	Logo Vertical	Logo Horizontal	Icon
Colour	TeraFlow	TeraFlow	
White	TeraFlow	TeraFlow	

Figure 3: TeraFlow Logo

The logo is available in various formats such as SVG, JPG, and PNG. All project partners have access to the file repository and external partiers will have access via the project website.

2.1.1.2. Font

The main project fonts to be used by TeraFlow in communication and dissemination material, including PowerPoint Presentations, are **Century Gothic** for titles and Calibri Light for body text.

Both fonts are easy to read and similar to most commonly used fonts such as Arial or Calibri, although it gives character to TeraFlow with a font similar to the typography of the logo and with more simple lines that transmit a more minimalistic feel. Calibri is a secondary font that will be used for other project content, non-intended mainly for external audiences, such as project deliverables.

2.1.1.3. Colours

Colours are a vital element of the project visual identity as they express our personality and tone. TeraFlow has a primary, secondary, and complementary colour palette used in various dissemination materials, as shown in Figure 1.

The primary colour palette is composed of the TeraFlow blues and white. These colours are used in all communications. The secondary colour palette is composed of a wide range of grey tones. The complementary colours are used on occasions when adding colour is necessary for a more dynamic look. However, the complementary colours should always be used with primary and/or secondary colours.

2.1.1.4. Iconography

Icons are an effective element to communicate concepts in a visual way. To transmit clear messages while keeping a simple look during dissemination and communication activities such as events, the use of icons has been highly recommended among the consortium instead of using large blocks of text. Several icon options related to TeraFlow thematics are available at the repository.

2.1.1.5. Language

The official language of the TeraFlow project is British English. However, the dissemination material such as press releases should be translated into the different partners' languages in order to reach local audiences in an effective way. The social media accounts of the project will only post content related to events in other languages if the event is not held in English.

2.2. Objectives

As outlined in the proposal, the main goal of T6.1 is to achieve maximum visibility and raise awareness of TeraFlow among different stakeholders and audiences. However, since this task consists of communication and dissemination activities, it is important to define some specific objectives that relate to the execution of all the activities foreseen in these two activities:

- Ensure maximum visibility and awareness of TeraFlow, its progress, and results among key target audiences through a solid digital strategy focused on delivering relevant content and messages for achieving 2500 unique visitors on the website and 1.2% engagement rate on social media accounts by the end of the project.
- Boost online and offline visibility of the project by creating valuable content in different formats following the visual identity defined for TeraFlow such as blog posts, brochure, videos, and newsletters.
- Diffuse the research and technological knowledge generated in the project within and beyond the consortium promptly by developing at least 25 scientific publications, 10 articles in specialised magazines/journals, and 5 posters.
- Attract potential users, and customers, and stimulate the appropriate market segments to validate and support the project's exploitation strategy, promoting the early uptake of the final release of TeraFlow, by organising at least 2 project workshops, 10 demos events, and defining liaison and joint activities with other projects and relevant communities.

The metrics expressed for each objective are listed in Section 2.6 Key Performance Indicators (KPIs).

2.3. Stakeholders

A preliminary stakeholder's analysis was conducted to understand which target groups and audiences are involved or could be interested in TeraFlow results. The analysis helped to prioritise groups and messages to engage with them in a more directed and targeted way, which is essential T6.1, and therefore this deliverable.

However, it is important to mention that due to the nature of other tasks, the analysis of stakeholders and hence the way and messages TeraFlow will use to interact with them will evolve in the future. The tasks are:

- T2.3 – Business Models Analysis: The goal of this task is to: (1) conduct a stakeholder and ecosystem analysis of the TeraFlow system considering both the current and anticipated business ecosystem evolution, (2) design business models for the SDN managed flow architecture developed as a part of the TeraFlow project, and (3) to conduct dynamic market simulations of the TeraFlow business ecosystem.
- T6.3: Exploitation strategy and roadmap: This task focuses on the development of business models and plans, as well as strategies towards the exploitation of project results over the project lifetime and after the project end.

In this sense, the three tasks will be coordinated to achieve maximum results and achieve the objectives without overlapping efforts or work.

Table 1 presents a preliminary overview of the key target audiences identified by TeraFlow. These have been identified using the 5G-PPP stakeholders' categories.

Name	Working definition	Interest in TeraFlow
Telecom Service Providers	Private or public company working within the telecommunications industry for land and wireless communications, cable, satellite, mobile network operators, communication service providers, mobile virtual network operators, networking, data services, among others in Europe. Examples: Deutsche Telekom, Telefónica, Vodafone, Orange, BT, Telenor, TIM, Swisscom, KPN, CoopVoce, Cubic Telecom, Freenet Group, PosteMobile, Sierra Wireless, Sipgate Wirless, Sky, Teledema, Transatel, Ventocom, etc.	- Explore B5G concepts and innovation related to SDN, cloud-native architectures, trust, secure and autonomous solutions Implement solutions on their own networks
5G Vendors	Companies and individuals working for companies selling 5G radio hardware and 5G systems for carriers. Examples: Qualcomm, Cisco, Ericsson, Huaweri, Samsung, ZTE, NFWare, ALTRAN, among others.	Support and validate the adoption of TeraFlow results by industrial players facing today's challenges in the development of the specific components, concepts and methodologies developed in the project.
ICT Providers and Software Developers	Companies and/or individuals providing services and technology based for Big Data, Cloud, AI, Blockchain, and other technologies related to the project.	Support and validate the adoption of TeraFlow results to complement their current offering.

	Examples: Atos, Accenture, SAP, Capgemini, T-Systems, Computacenter, MicroFocus, HPE, etc	
Business Verticals	Vertical markets that can benefit from 5G networks and solutions such as automotive, energy, food and agriculture, smart cities, healthcare, manufacturing, transportation, among many others. A special approach will be made for the three scenarios defined for TeraFlow.	Create new business opportunities by adopting TeraFlow results. These opportunities will arise once the project has delivered mature technical results and validated them in the three defined scenarios.
Open Source Communities	Communities bringing people together with shared interests in 5G and other topics addressed by TeraFlow, to collaboratively build something to be shared within or outside the community. Example: OpenStack, OpenDayLight, ONG, ONOS	Extension of functionalities and even integration of different TeraFlow elements/concepts into their solutions to ensure the sustainability of the project results and uptake by third parties. Some synergies have been identified and presented in Section 3.2
Standards Groups	Organisations and individuals working within organisations developing, coordinating, promulgating, revising, amending and producing technical standards intended to address needs of adopters. Example: 3GPP, ETSI, ITU, IETF/IRTF, IEEE	Standardisation of some of the technological developments and/or concepts within TeraFlow. The consortium partners are participating within several relevant standardisation and industrial groups as shown in Section 3.1
5G-related Organisations, Projects, and Associations	5G-PPP and parties actively collaborating with this community including projects that are part of Phase 3.6: 5G Innovation and Beyond 5G. Also, other organisations related to 5G at the international level. Example: 5G Forum, IMT2020, NGMN, 5GAmericas, AIOTI, BDVA/DAIRO, BBF, 6GBRAINS, AI@EDGE, DAEMON, DEDICAT6G, Hexa-X, MARSAL, REINDEER, RISE-6G	Joint effort in the design and definition of some common components, concepts, and methodologies. Collaboration in joint workshops/demos and other clustering activities. Potential bidirectional adoption of specific components/approaches that may support sustainability of projects.
Research and Academia	Universities, research centres, and industry R&D departments, and individuals involved within these, with a special focus on 5G developments, topics addressed by TeraFlow, and business verticals that could leverage the concepts and results of the project.	Scientific contribution and advances in the worldwide scientific community for future network architectures and their application in their academical activities (courses, student projects, seminars, etc.).

Media	Mainstream and specialised media in countries represented by the TeraFlow Consortium, and international media, covering topics related to telecommunications, 5G, Innovation, technology, business, among others. The main interest would be to showcase innovation and new projects supporting the European innovation ecosystem.
Public in General	Address the public policy perspective of EU research and innovation funding, increasing awareness and stimulating the interest of multiple audiences (opinion leaders, institutions, final consumers, and citizens), who can be benefited by the project results and developments.

Table 1: TeraFlow Target Audiences

Regarding to the communication and dissemination activities that will be executed within TeraFlow, relevant key messages shall be shared to specific audiences according to their interest and potential relationship with the project. A detailed message analysis will be presented in D6.2 using as input the market and stakeholders' analysis done within T2.3 and T6.3. Nevertheless, this deliverable shows in Table 2 the main channels and activities used to target each one of the key audiences.

Target Audience	Website	Twitter	LinkedIn	Comm Material	Scientific Publications	Press Releases	Newsletter	Blog Posts	Events & Workshops
Telecom Service Providers	x	x	x	x		x	x	x	x
5G Service Providers and Vendors	x	x	x	x		x	x	x	x
ICT Providers and Software Developers	x	x	x	x		x	x	x	x
Business Verticals	x	x	x	x		x	x	x	x
Open Source Communities	x	x			x	x	x		x
Standards Groups	x	x			x	x	x		x
5G-related Organisations Projects, and Associations	x	x	x		x	x	x		x
Research and Academia	x				x		x		x
Media	x					x			
Public in General	x	x	x			x			

Table 2: Target audiences - Channels and activities

2.4. Phases and Messages

Considering the duration of the project, the planned technical progress, the main milestones, as well as other elements of the development of the TeraFlow OS and components, a three-phase strategy has been defined to better reach external audiences with the latest news about the evolution of the project. This strategy was already drafted at the proposal stage and has been used as the main basis for this deliverable. Nevertheless, if needed the strategy shall be modified to meet the project's needs and its stakeholders. For each one of the phases, specific topics identified will be promoted on social media as part of the general content shared by the project to different audiences. Also, each phase will be reflected on the website with the creation and update of content and modification of website structure to guarantee the delivery of up-to-date information.

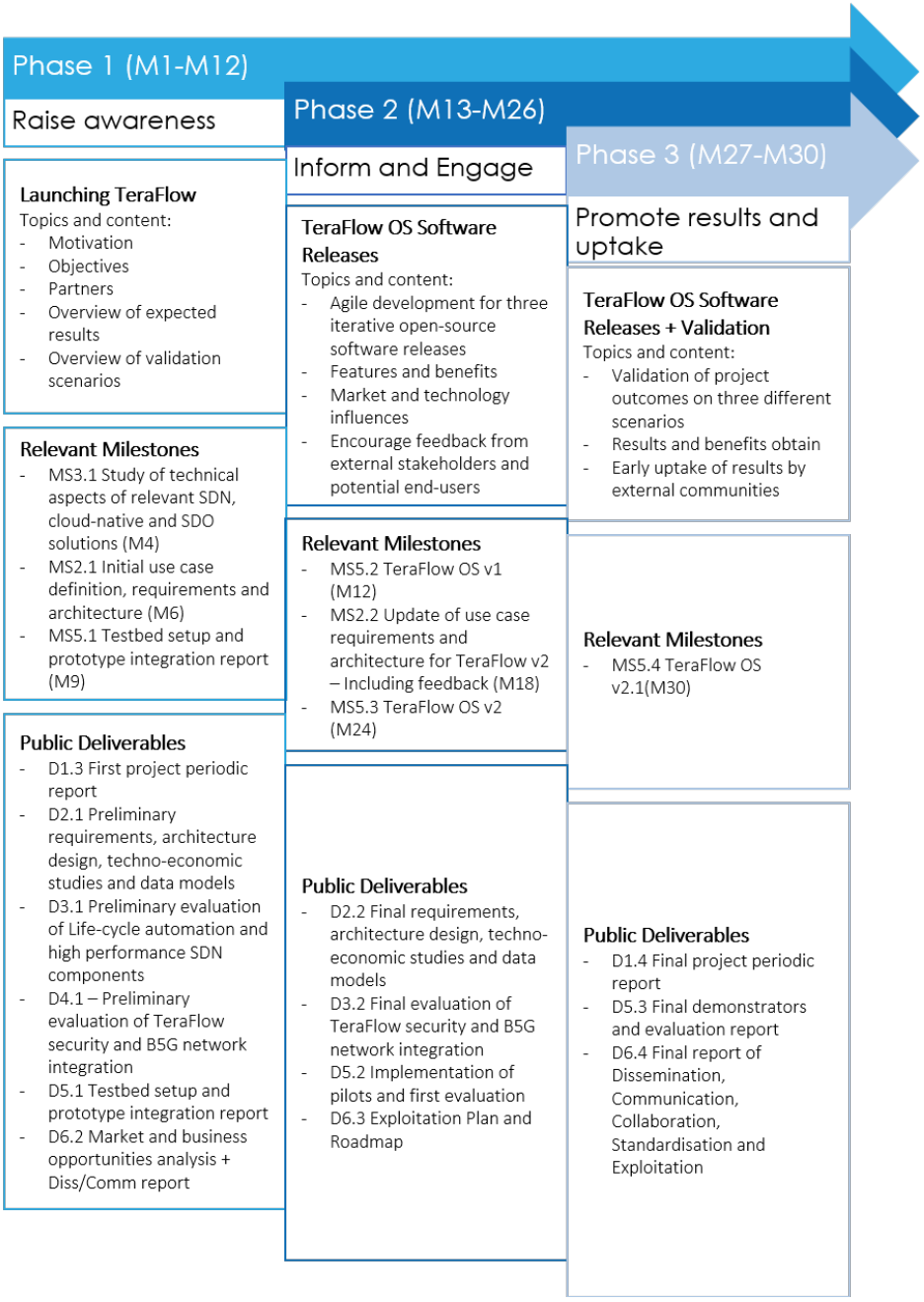

Figure 4: TeraFlow Communication / Dissemination Strategy

As shown in Figure 4, our strategy follows the evolution of the project as it experiments with the technical issue. Progress will be communicated through various channels and activities until reaching a phase where the main aim is to promote results and uptake by external communities. In this sense, the messages will be aligned with the progress, and the tone used will vary from technical to commercial, mainly targeting potential end-users.

Phase 1, between January and December 2021, will be devoted to **raising awareness** about the project, identifying key stakeholder communities and target audiences with whom the project can start creating relationships and finding synergies to plan joint activities. For this purpose, being part of the 5G Infrastructure Public Partner Partnership (5G-PPP), a joint initiative between the European Commission and the European ICT industry, is essential to work hand-in-hand with various stakeholders and find interesting opportunities to maximise the impact of TeraFlow. From a communication point of view, the focus is **ensuring that people and organisations involved in activities and topics relevant for TeraFlow are aware of the project's existence, motivation, expected outcomes, and how those results can benefit them according to their roles**. Moreover, introducing the partners involved in TeraFlow and the scenarios where the technologies developed will be validated constitutes another important topic to share with external audiences.

The first release of the TeraFlow OS will be in December 2021. **Phase 2 – Inform and engage**, will start when this release is made, and will continue until February 2023. The availability of results at this point will be fundamental to **demonstrate the progress and engage with stakeholders targeted in Phase 1, while also supporting business and exploitation tasks to collect valuable feedback for the creation of the roadmap considering stakeholders' points of view**. Within this phase, release 2.0 of the TeraFlow OS and the first validation on the three scenarios defined will take place, being one of the most relevant milestones to share and use as input to engage with external communities at industrial events and exhibitions. In addition, at this phase, there will be a special focus on **creating appealing and "marketable" material describing the results to increase the willingness of third parties to participate in the validation and other various activities.**

While continuing the communication and networking activities of the first two phases, the last three months will be devoted to **Phase 3 – Promote results and uptake with the primary goal to demonstrate to potential adopters the relevance of TeraFlow**. Hence, commercial activities will be executed to support the adoption of TeraFlow results by external stakeholders. In this case, targeted activities and demonstrations will take place to showcase the potential of the results and their benefits. In addition, the communication channels will be modified to reflect a more commercial look towards the end of the project. Last but not least, and even when throughout the life of the project all activities will be shared through all the owned channels (website, social media, ZENODO community, etc), at this phase the communication team will make sure that all materials and results are publicly available.

As mentioned, the frequent monitoring of the activities and results of the communication and dissemination strategy will be fundamental to make sure everything is going as planned. In case of modifications due to deviations or external factors out of our control, changes and alternative activities will be presented in later deliverables from this WP.

2.5. Channels and Tactics

To efficiently reach the metrics and to maximise the visibility of TeraFlow according to the phases described, a broad range of communication and dissemination channels and tactics have been selected to cover both online and offline scenarios, therefore creating a comprehensive 360º strategy targeting selected audiences.

The **digital ecosystem** composed by the project website and social media accounts act as a primary point of information and direct contact with the project and its members. The publication of project information on partners' websites and social media accounts will be also highly encouraged to maximise the reach and raise awareness.

Various **communication materials** such as templates, brochures, presentations, posters, infographics, videos, social media banners, virtual backgrounds, among other graphical material will be produced throughout the life of TeraFlow to maximise the project recognition and to position among online and offline venues.

The development of **scientific and research papers** is foreseen to achieve relevant publications in high-ranked peer-reviewed **journals** and venues in the research areas of interest of TeraFlow. In the same sense, the submission of these papers and their subsequent presentation at **specialised conferences or workshops** is an essential tactic specifically targeting research and academic audiences towards our research results known.

Satisfying business requirements and encouraging engagement with TeraFlow will be possible through a strong **content strategy** based on the identification of relevant topics considering stakeholders' potential interest in the project. These will be further developed in various written formats and shared across a wide array of channels. Within this content strategy, the development of **press releases** is foreseen when important milestones are reached, **bi-annual newsletters** sharing the progress of the project and most important news, and **blog posts and interviews** on the website to stimulate interest in the project and to demonstrate the work and results achieved.

Either in physical or virtual format, the participation in external **events** and the organisation of **workshops** is one of the main activities that will be held to present the progress and results of TeraFlow to external audiences. Collaboration with related projects will be explored to leverage synergies and maximise the project's reach and impact, and contacts through the 5G-PPP initiative will be used.

The following subsections present a more detailed description for each one of the channels and tactics defined.

2.5.1. TeraFlow Website

Available at the URL https://www.teraflow-h2020.eu/, since January 2021, the project website has been created by Atos Research and Innovation - Website Design team using the open-source Content Management Software (CMS) Drupal. This tool allows the creation of secure, interactive, and flexible websites providing a good user experience and usability. The project website acts as the most important channel for communicating and disseminating TeraFlow's progress, activities, news, publications, deliverables, and results, among internal and external stakeholders.

To reflect up to date information corresponding to the status of the project, the website will be regularly updated with information about the work done, results, deliverables and scientific publications. Moreover, the latest and upcoming events in which TeraFlow partners will participate and feature their work within the project will be constantly updated. When possible, the presentations and recordings of the sessions after the event has taken place will be posted. Furthermore, news pieces with technical information about the project and other dissemination activities and material such as videos, flyers, etc. will be updated as they become available. Finally, the blog section will be updated with partners' contributions to establish TeraFlow and its consortium as a source of thought leadership.

As described previously, to also reflect the project's progress on the technical side, the look and feel of the website and its structure will be modified along with the different phases of the strategy. Figure 6 presents the current structure and disposition of the project website, while Figure 7 presents the structure it will adopt from Phase 2 onwards. The new and static pages, providing information about the project are reflected with a dotted line in Figure 7 and will be updated with new content at the beginning of each new phase.

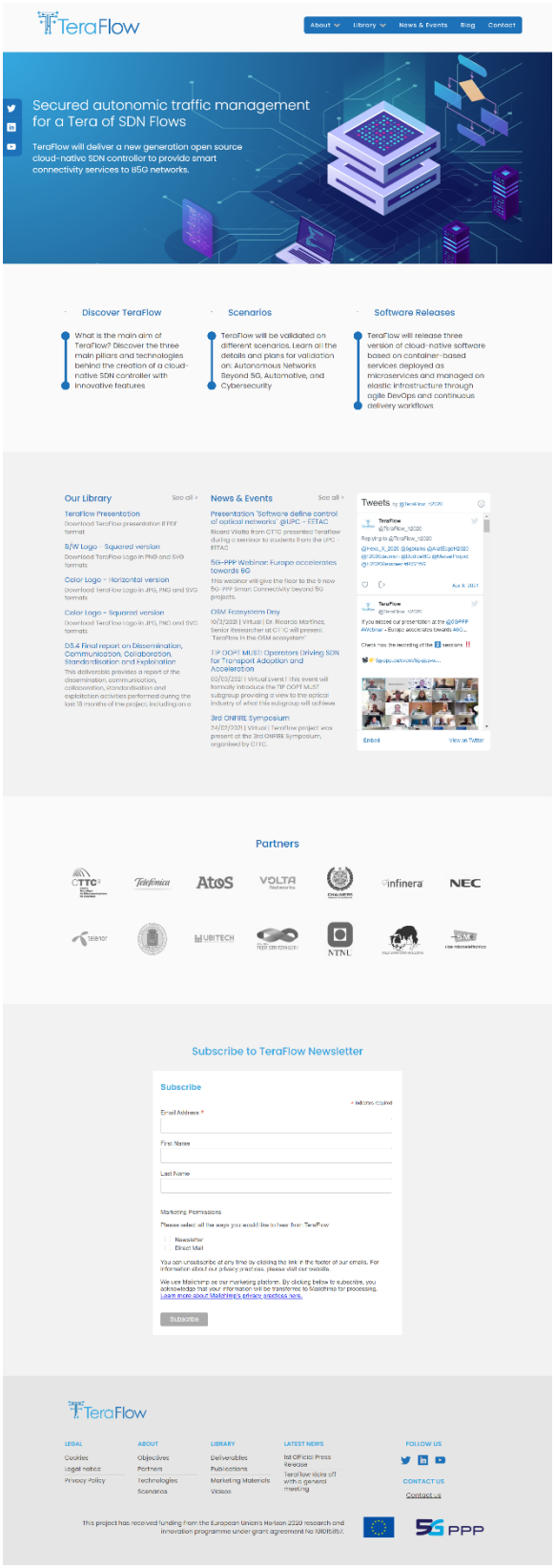

Figure 5: TeraFlow Website - Home page

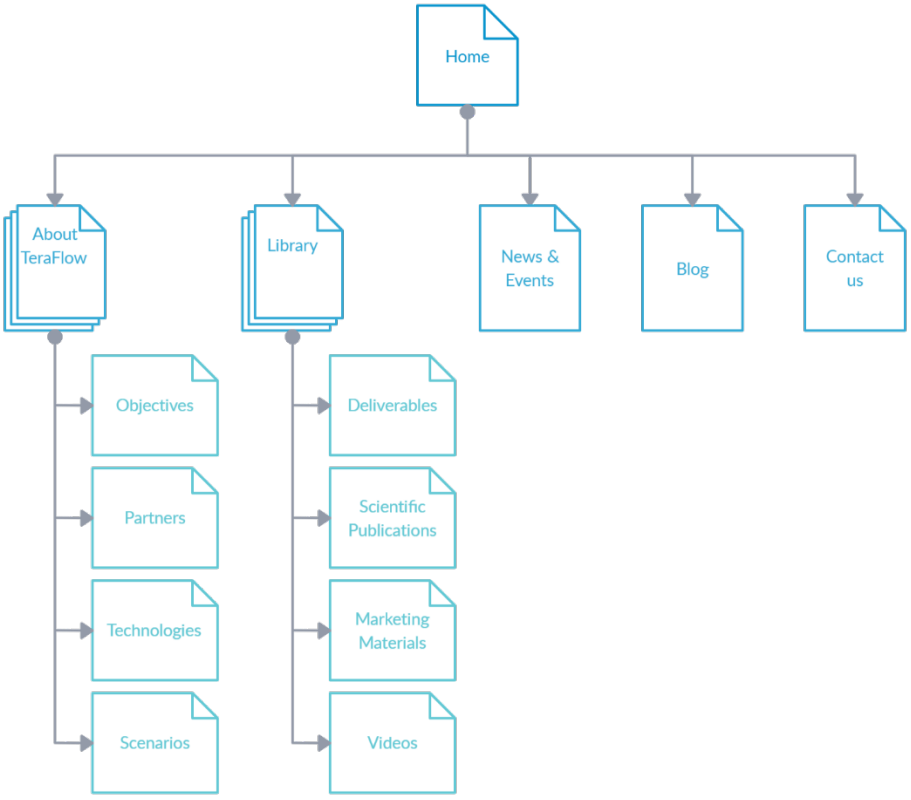

Figure 6: TeraFlow Website Structure 2021 - Phase 1

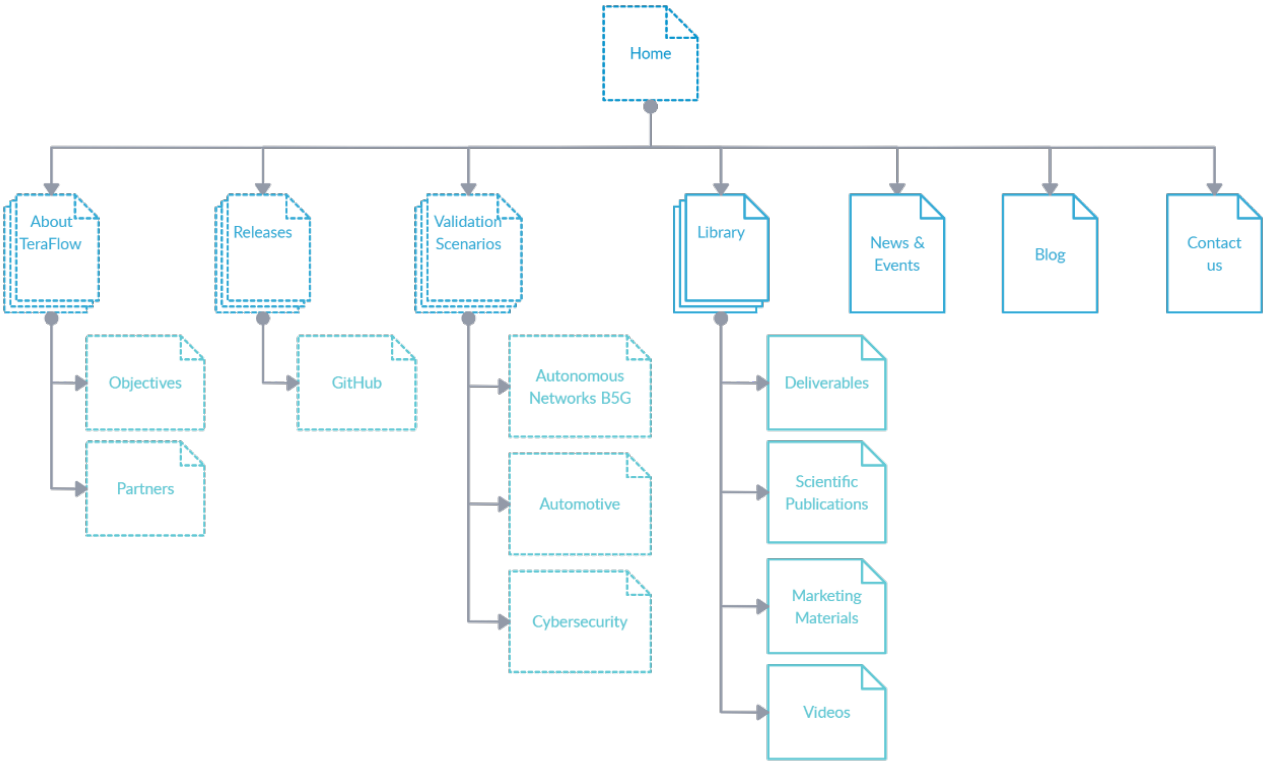

Figure 7: TeraFlow Website Structure - Phase 2 and 3

To obtain relevant information related to how visitors perceive and interact with the content published on the website, the Google Analytics monitoring tool will be used. Information about the cookies gathered by this tool has been included in the legal notice of the website which is available as a pop-up when accessing the website for the first time, and always via the footer.

It is also worth mentioning that the website has been built following various (search engine optimisation – SEO) guidelines to increase quantity and quality of traffic to the website through organic search engine results. These include keywords strategy, HTTPS protocol, HTML-only content, image nomenclature with keywords, headings, meta descriptions, among many others. Concerning SEO, a link building strategy is being developed including both, internal and external links, to enhance the positioning of the TeraFlow website on different browsers.

The use of Google Analytics and SEO will help the dissemination and communication team to ensure effectiveness of the strategy. Between January and March 2021, the following metrics have been achieved: Unique visitors (933), Sessions (1,072), Number of sessions per user (1.15), Page views (1,682), Page/Session (1.57), and Avg. Session Duration (1 minute).

2.5.2. Social Media

Various social media channel will provide fundamental mechanism and boost dissemination and communication activities while also engaging with target audiences and key stakeholders. Due to their relevance and frequent use by targeted audiences, two leading social media channels have been selected: Twitter and LinkedIn. Both accounts will be used to share key messages and information about the project and activities of the project and learn and interact with the latest updates within the 5G community and related projects.

The strategy and content shared on these channels are led by ATOS as the leader of T6.1. As explained in the Dissemination and Communication Guidelines (Figure 2), partners shall notify the project consortium about any dissemination or communication activity before it is executed. This will also allow ATOS to update the website and promote the activity on social media accounts. Hence, creating an impactful, flexible, and solid communication flow from partners to external stakeholders and target audiences.

In addition to Twitter and LinkedIn, a dedicated YouTube channel (https://www.youtube.com/channel/UCz86mcBvscgA4tS_voXokyQ) has been created as the main repository for sharing all the audio-visual content created within the project as marketing material which includes project video and demo sessions, webinars, among others.

TeraFlow's social media strategy considers not only the accounts created for the project but goes a step further into considering as part of its ecosystem **shared** and **earned** accounts. **Shared social media** refers to the accounts owned by TeraFlow consortium partners who also contribute to spread the word and maximise the reach of the project messages. On the other hand, **earned accounts** are the external ones that post information related to TeraFlow or constantly interact with the project posts because of public and influencer efforts, with the aim of generating and increasing engagement and interactions among key stakeholders and target audiences while also boosting the visibility of TeraFlow's social media channels. In this latter category are included accounts owned by related projects, 5G-PPP, standardisation bodies, among others.

Last but not least, the following subsections highlight the graphics imagery created for the profiles of each account follow the branding guidelines established. The imagery will be updated to communicate

milestones reached and provide extra visibility to certain topics (e.g., releases). In addition, the profiles provide the appropriate acknowledgement of EU funding. Also, dedicated social media banners for relevant posts are created as part of communication material to increase the engagement rates with followers.

2.5.2.1. Twitter

The TeraFlow Twitter - @TeraFlow_h2020 - (https://twitter.com/TeraFlow_h2020) account was created in January 2021. Through this channel, the project will reach most of the target audiences by spreading the word about the project activities and news related to the progress, milestones, software releases, components, among others. Moreover, the account is used to promote and cover internal and external events in real-time to increase engagement.

Figure 8: TeraFlow's Twitter account

Part of the strategy also considers posting third party news about related topics, and to support the dissemination efforts of other projects part of the 5G-PPP. Some specific tactics that have been already implemented to boost the presence of TeraFlow on this social media account include:

- Creation of specific campaigns according to the strategy phase and the communication needs in order to group the content and posts in an easy way and evaluate which type of content is better received according to the engagement rate.
- Constant interaction with target groups (mention, retweet with or without comment, like, direct messages).
- Engage with influential individuals and people in the telecommunications, research, and innovation ecosystems.
- Creation and use of appealing visuals, GIFs, and short videos to increase the engagement
- Include “Call to Action” messages to redirect traffic to the project website.
- Use emojis and hashtags such as #TeraFlow, #H2020, #5G, #SDN, etc. Hashtags will be identified according to the phase and theme of the posts.

Twitter Analytics will be used to monitor, the account’s performance every month and to gather relevant metrics to understand how the content is perceived by followers giving us the opportunity to improve future content and actions. Between January and March 2021, the following metrics have been achieved: Tweets (28), Retweets (80), Likes (176), Followers (100), Engagement Rate (1.5%), and Impressions (21.600).

2.5.2.2. LinkedIn

TeraFlow's LinkedIn – TeraFlow H2020 - (https://www.linkedin.com/company/teraflow-h2020/) company page was also created in January 2021. This account is used to post project news and events, as well as content related to the project's progress and results with a more specialised and technical tone since its approach is more professional and business oriented.

Furthermore, LinkedIn will be used to reach potential end-users and attract decision-makers to raise awareness on the project and involve external 3rd parties in the validation of the results. The page has been created as a "company" to comply with LinkedIn's profile guidelines and to allow partners to add it to their personal profile for more visibility. In addition, selected members of the consortium will be added as part of the administration group, so they are able to suggest and send invitations to their personal network.

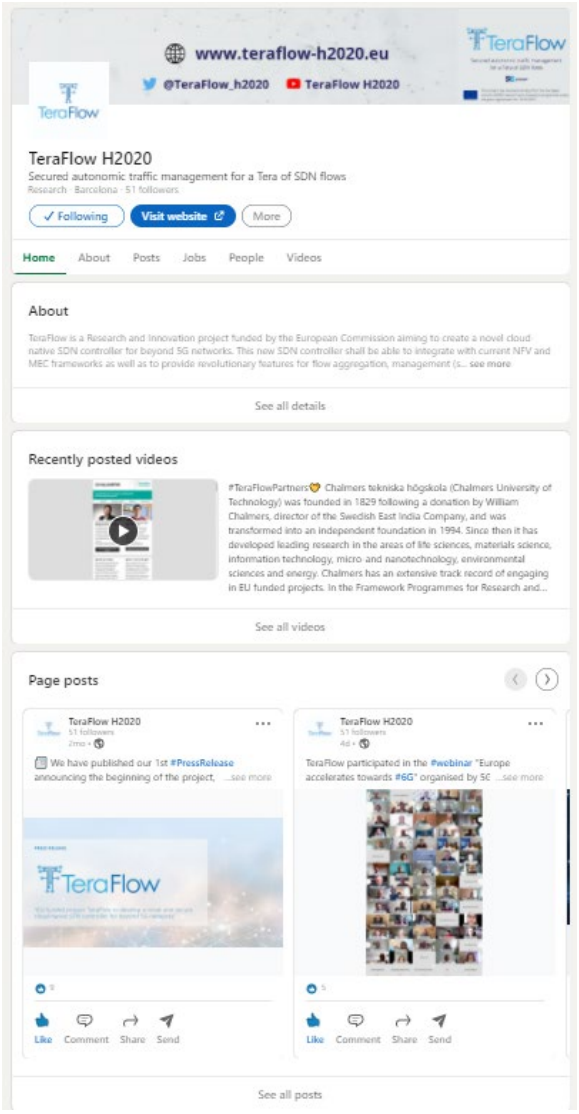

Figure 9: TeraFlow's LinkedIn Account

Some of the specific tactics that will be followed on this social network include:

- Engaging with relevant communities, projects, and pages
- Mention relevant people and/or companies on the posts to increase connections and visibility of the account
- Use hashtags to get discovered
- Create and upload rich images and videos together with written content
- Engage with followers in the comments
- Encourage comments by asking questions in the posts.

Through the LinkedIn Analytics tool, monthly monitoring of various metrics will provide useful information on how the shared content is perceived by the followers of the account, allowing the team to adapt the strategy if necessary. Between January and March 2021, the following metrics have been achieved: Total Unique Visitors (80), Total Page Views (166), Impressions (1492), Engagement Rate (4%), Followers (45).

2.5.3. Communication Material

The branding and visual identity defined for TeraFlow, and the development of communication and marketing material are intended to raise awareness about the project. Following the aim of each phase, different material will be created to communicate the objectives and expected results (Phase 1), share valuable information about the progress of technical results such as the releases of TeraFlow OS (Phase 2), and finally, encourage external parties and potential end-users to make use of the project results (Phase 3).

This material will range from brochures, infographics, and social media banners, to animated videos. It will provide various formats with different content that can be used at digital or physical venues according to specific communication needs identified to better engage with key stakeholders. That is one of the reasons why this material will be fundamental at the end of the project to showcase the project results translated into business benefits for end-users.

The material created to the date of this deliverable is presented in the following figures.

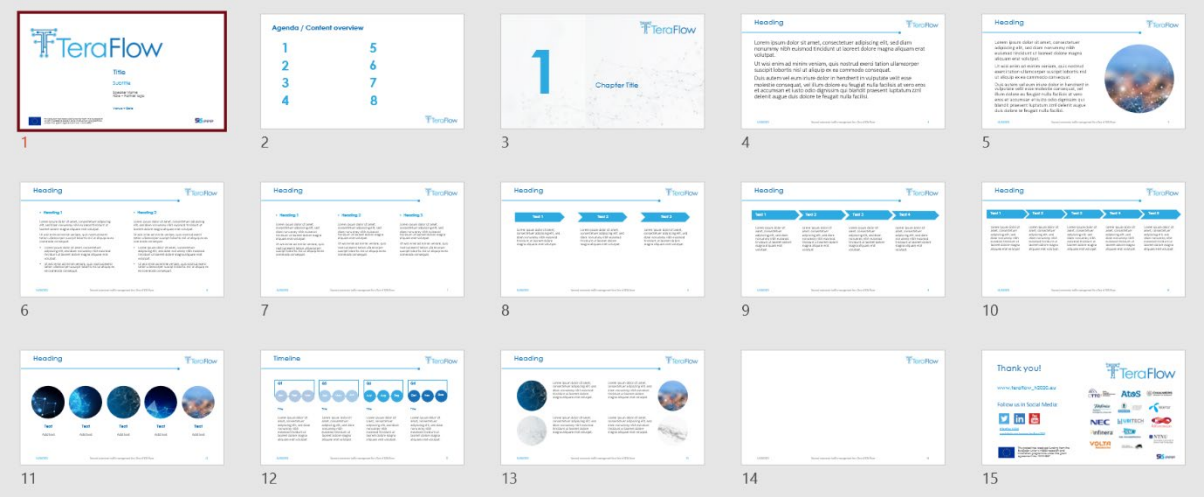

Figure 10: TeraFlow PPT Template

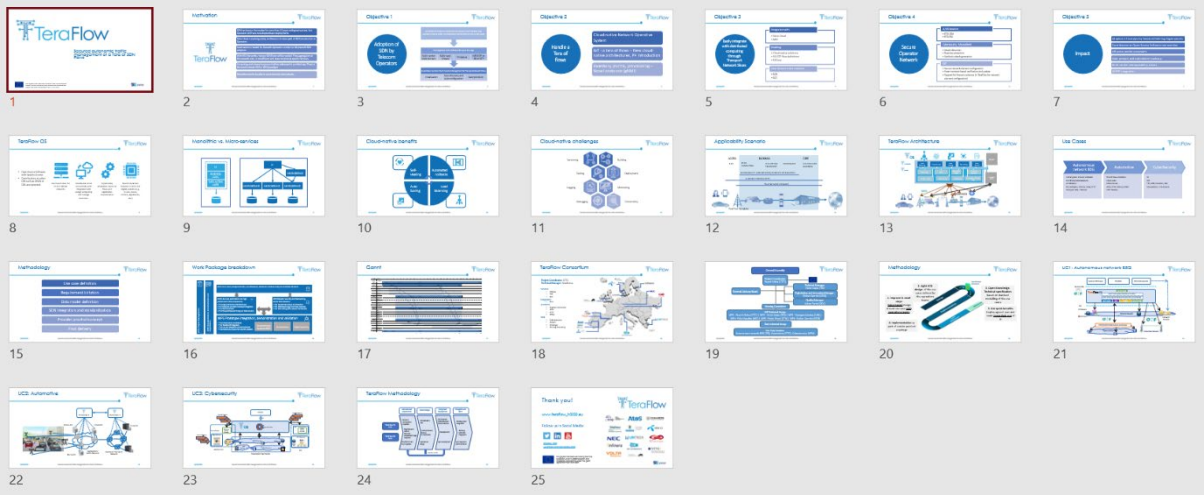

Figure 11: TeraFlow Project Overview PPT

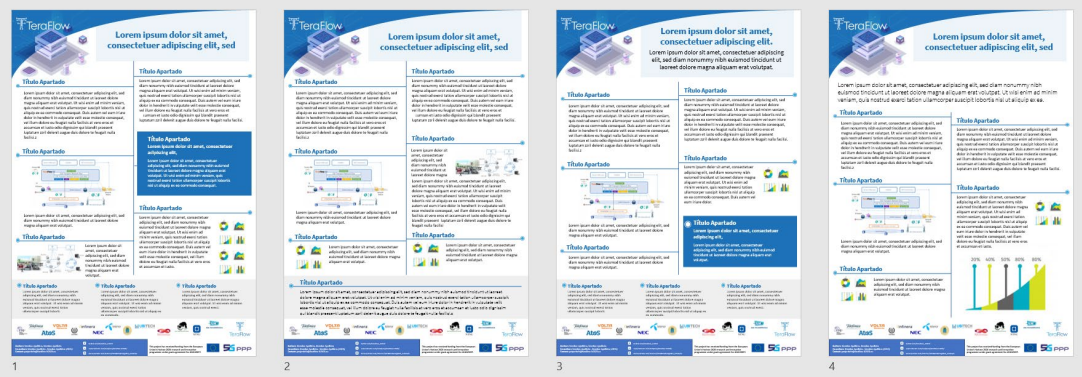

Figure 12: TeraFlow Poster Template

Figure 13: TeraFlow Virtual Backgrounds

Figure 14: TeraFlow Newsletter Template

Figure 15: TeraFlow Social Media Banners

Foreseen material for Phase 1 of the strategy includes:

- Flyer/Infographics describing TeraFlow's vision, expected outcomes and validation scenarios to provide the most relevant information to target audiences in a visually appealing. Moreover, based on this first flyer, other versions with updated information will be developed throughout the life of the project.
- A promotional video describing the project's concept, research areas, expected benefits, and validation scenarios. The video will be uploaded to the YouTube channel of the project and shared through various owned, shared, and earned social media channels as well as websites to amplify the reach.

2.5.4. Journal Publications and Scientific Papers

As part of the dissemination approach to generate impact among research and academic communities for fostering the use of results and for sharing innovations within TeraFlow, the development of papers for scientific workshops and conferences, and the production of journal papers is foreseen along with the organisation of dedicated events to engage with various communities and 5G stakeholders.

It is important to mention that TeraFlow follows an Open Access (OA) approach, which means that the peer-reviewed scientific content and research data produced within the project must be free of charge to any user for online access. For this purpose, once published by the corresponding conference proceeding, journal, etc., the papers will be made available at the project website and TeraFlow ZENODO Community (https://zenodo.org/communities/teraflow-h2020/?page=1&size=20), while also being highly promoted through social media channels. In addition, once accepted by the EC all public deliverables will be made publicly available on the same channels.

According to the publication guidelines defined by the TeraFlow consortium, all planned publications must be notified to all partners at least 45 calendar days before the publication. Any objection shall be made in accordance with the GA in writing to the Coordinator and the Party/ies proposing the dissemination material within 30 calendar days after receipt of the notice. If no objection is made within the time limit stated, the publication is permitted.

The following table presents the scientific conferences, journals and magazines targeted by the project and the consortium partners for developing and submitting papers. This list does not have a compulsory character meaning that partners will consider these venues, but the submission is not mandatory.

Type	Name	Description[3]	Link
Journal/Magazine	IEEE Transactions on Network and Service Management (TNSM)	Journal for timely publication of archival research on the management of networks, systems, services and applications, as well as on issues in communications software, service engineering, policies and business processes for network and service management.	https://www.comsoc.org/publications/journals/ieee-tnsm
	IEEE Communications Magazine	Provides international coverage of current issues and advances in key areas of wireless, optical and wired communications. Written in tutorial applications-driven style by the industry's leading experts, it delivers practical, current information on hot topics, implementations, and best industry practices.	https://www.comsoc.org/publications/magazines/ieee-communicat

[3] Description has been taken from each journal, magazine or conference website

			ions-magazine
	IEEE Transactions on Communication	Publishes high-quality manuscripts on advances in the state-of-the-art of all telecommunications including telephone, telegraphy, facsimile, and television, by electromagnetic propagation including radio; wire; aerial; underground, coaxial, and submarine cables; waveguides, communication satellites, and lasers; in marine, aeronautical, space, and fixed station services; repeaters, radio relaying, signal storage, and regeneration; telecommunication error detection and correction; multiplexing and carrier techniques; communication switching systems; data communications; and communication theory.	https://ieeexplore.ieee.org/xpl/RecentIssue.jsp?punumber=26
	IEEE Transactions on Mobile Computing	Focuses on the key technical issues related to (a) architectures, (b) support services, (c) algorithm/protocol design and analysis, (d) mobile environments, (e) mobile communication systems, (f) applications, and (g) emerging technologies.	https://www.scimagojr.com/journalsearch.php?q=25038&tip=sid
	International Journal of Computer and Telecommunication Networking	Bimonthly open access peer-reviewed journal that publishes articles which contribute new results in all areas of Computer Networks & Communications. The journal focuses on all technical and practical aspects of Computer Networks & data Communications.	https://dl.acm.org/journal/cntw
	IEEE/OSA Journal of Optical Communication and Networking	The Optical Society (OSA) publishes high-quality, peer-reviewed articles in its portfolio of journals, which serve the full breadth of the optics and photonics community. The scope of the Journal includes advances in the state-of-the-art of optical networking science, technology, and engineering. Both theoretical contributions (including new techniques, concepts, analyses, and economic studies) and practical contributions (including optical networking experiments, prototypes, and new applications) are encouraged.	https://www.osapublishing.org/jocn/home.cfm
	IEEE Open Journal of the Communication Society (OJ-COMS)	Covers science, technology, applications and standards for information organization, collection and transfer using electronic, optical and wireless channels and networks, including but not limited to: Systems and network architecture, control and management; Protocols, software and middleware; Quality of service, reliability and security; Modulation, detection, coding, and signaling; Switching and routing; Mobile and portable communications; Terminals and other end-user devices; Networks for content distribution and distributed computing; and Communications-based distributed resources control.	https://www.comsoc.org/publications/journals/ieee-ojcoms

	IEEE Network Magazine	Published bimonthly, offers readers topics of interest to the networking community. As such, IEEE Network provides a focus for highlighting and discussing major computer communications issues and developments. The articles are intended to be surveys or tutorials, slanted towards the practical, and comprehensible to the nonspecialist, as well as practitioners.	https://www.comsoc.org/publications/magazines/ieee-network/cfp
	Elsevier Telecommunications Policy	Telecommunications Policy is concerned with the impact of digitalization in the economy and society. The scope includes policy, regulation, and governance; big data, artificial intelligence and data science; new and traditional sectors encompassing new media and the platform economy; management, entrepreneurship, innovation and use.	https://www.journals.elsevier.com/telecommunications-policy
	Journal of Network and Service Management	Features peer-reviewed original research and case studies in the fields of network and systems management. It regularly disseminates significant new information on both the communication and computing aspects and covers management of modern network and service technologies (e.g. 5G and beyond, Internet of Things, software-defined networks, high-precision networks, security, and Augmented Reality/Virtual Reality services).	https://www.springer.com/journal/10922
	Journal of Machine Learning Research	Provides an international forum for the electronic and paper publication of high-quality scholarly articles in all areas of machine learning.	https://www.jmlr.org/
	MDPI Photonics	Special Issue: "Latest Advances in Software Defined Networking (SDN) for Optical Networks"	https://www.mdpi.com/journal/photonics/special_issues/SDN_optical_networks
	Elsevier Neurocomputing	Neurocomputing publishes articles describing recent fundamental contributions in the field of neurocomputing. Neurocomputing theory, practice and applications are the essential topics being covered.	https://www.journals.elsevier.com/neurocomputing
	Information Sciences and Journal of Expert Systems with Data Applications	Refereed international journal whose focus is on exchanging information relating to expert and intelligent systems applied in industry, government, and universities worldwide.	https://www.journals.elsevier.com/expert-systems-with-applications
	ACM Transaction of Management Information Systems	Quarterly journal that focuses on publishing high quality information systems research. TMIS welcomes innovative work on the design, development, assessment, and management of	https://dl.acm.org/journal/tmis

		information technology and systems within organizations, businesses, and societies.	
	IEEE Transactions on Knowledge and Data Engineering	The scope includes the knowledge and data engineering aspects of computer science, artificial intelligence, electrical engineering, computer engineering, and other appropriate fields. This Transactions provides an international and interdisciplinary forum to communicate results of new developments in knowledge and data engineering and the feasibility studies of these ideas in hardware and software.	https://ieeexplore.ieee.org/xpl/RecentIssue.jsp?punumber=69
	IEEE Transactions on Information Forensics and Security (TIFS)	Covers the sciences, technologies, and applications relating to information forensics, information security, biometrics, surveillance and systems applications that incorporate these features.	https://ieeexplore.ieee.org/xpl/RecentIssue.jsp?punumber=10206
	ACM Transactions on Privacy and Security (TOPS)	Publishes high-quality research results in the fields of information and system security and privacy. Studies addressing all aspects of these fields are welcomed, ranging from technologies, to systems and applications, to the crafting of policies.	https://dl.acm.org/journal/tops
	IEEE Transactions on Pattern Analysis and Machine Intelligence	Publishes articles on all traditional areas of computer vision and image understanding, all traditional areas of pattern analysis and recognition, and selected areas of machine intelligence, with a particular emphasis on machine learning for pattern analysis.	https://ieeexplore.ieee.org/xpl/RecentIssue.jsp?punumber=34
Conferences	IEEE NFV/SDN	An important forum for the ongoing exchange of the latest ideas, developments and results amongst ecosystem partners in both academia and industry. The conference fosters knowledge sharing and discussion on new approaches as well as work addressing gaps and improvements in NFV and SDN enabled architectures, algorithms and operational frameworks for virtualized network functions and infrastructures.	https://nfvsdn2020.ieee-nfvsdn.org/
	The Optical Networking and Communication Conference & Exhibition (OFC)	The premier event in telecom and data center optics, considered the hub of the industry, OFC represents the entire ecosystem—from research to marketplace.	https://www.ofcconference.org/en-us/home/
	ECOC	Largest conference on Optical Communications in Europe, and one of the most prestigious and long-standing events in this field worldwide.	https://www.ecocexhibition.com/conference/
	IEEE International Conference on Communications (ICC)	IEEE International Conference on Communications (ICC) is one of the IEEE Communications Society's two flagship conferences dedicated to driving innovation in nearly every aspect of	https://icc2021.ieee-icc.org/about

	IEEE Global Communications Conference (GLOBECOM)	communications. Each year, around 3,000 researchers submit proposals for paper presentations and program sessions to be held at the annual conference.	https://globecom2021.ieee-globecom.org/about
	IEEE International Conference on Computer Communications (INFOCOM)	Top-ranked conference on networking in the research community. It is a major conference venue for researchers to present and exchange significant and innovative contributions and ideas in the field of networking and closely related areas. IEEE INFOCOM covers both theoretical and systems research.	https://infocom2021.ieee-infocom.org/about
	IEEE International Conference on Machine Learning and Applications (ICMLA)	The aim to bring researchers working in the areas of machine learning and applications together. The conference covers both theoretical and experimental research results.	https://www.icmla-conference.org/icmla21/
	ACM SIGCOMM	The flagship annual conference of the ACM Special Interest Group on Data Communication (SIGCOMM) on the applications, technologies, architectures, and protocols for computer communication.	https://conferences.sigcomm.org/sigcomm/2021/
	International Conference on Optical Network Design and Modelling (ONDM)	Addresses cutting-edge research in established areas of optical networking and their adoption in support of a wide variety of new services and applications. This includes the most recent trends such as 5G and beyond; data-centre networking; IoT; cloud/edge computing; content delivery; big data, data analytics, network telemetry and real-time monitoring; autonomic networking; artificial intelligence / machine learning assisted networks; visible light communications; and quantum secured networks.	https://ondm2021.chalmers.se/
	IEEE Symposium on Security & Privacy	Premier forum for presenting developments in computer security and electronic privacy, and for bringing together researchers and practitioners in the field.	https://www.ieee-security.org/TC/SP2021/cfpapers.html
	ACM Conference on Computer and Communications Security	Flagship annual conference of the Special Interest Group on Security, Audit and Control (SIGSAC) of the Association for Computing Machinery (ACM).	https://www.sigsac.org/ccs/CCS2021/
	IEEE/IFIP Network Operations and Management Symposium (NOMS)	Brings together researchers and practitioners from academia and industry and provides a multidisciplinary trend-setting forum to explore the hottest areas of information and communications technology management related to industry, academia, government, enterprise and other market segments from around the world.	https://im2021.ieee-im.org/
	ACM Symposium on SDN Research (SOSR)	Building on the success of the HotSDN (Hot Topics in Software Defined Networking) workshop, the Symposium on SDN Research (SOSR) is the premiere venue for research publications on SDN.	https://conferences.sigcomm.org/sosr/2020/

	ACM Symposium on Cloud Computing (SoCC)	Established series of symposia that bring together researchers, developers, practitioners, and users interested in cloud computing. SoCC is co-sponsored by the ACM Special Interest Groups on Management of Data (SIGMOD) and on Operating Systems (SIGOPS).	http://acmsocc.org/2021/
	EuCNC & 6GSummit	The conference is sponsored by the IEEE Communications Society and by the European Association for Signal Processing, and focuses on all aspects of telecommunications ranging from 5G deployment and mobile IoT to 6G exploration and future communications systems and networks, including experimentation and testbeds, and applications and services. It brings together cutting-edge research and world-renown industries and businesses, attracting in the last years more than 900 delegates from all over the world, to present and discuss the latest results, and an exhibition space of more than 1 500 m2 for demonstrating the technology developed in the area, namely from R&D programmes co-financed by the European Commission.	https://www.eucnc.eu/about/#
	International Conference on Network and Service Management (ICNSM)	Selective single-track conference, covering all aspects of the management of networks and services, pervasive systems, enterprises, and cloud computing environments. The core track will be accompanied by a series of workshops and poster sessions.	http://www.cnsm-conf.org/2021/cfp.html
	IEEE International Conference on Network Softwarization (NETSOFT)	Conference focused on Software-Defined Networking (SDN), Network Function Virtualization (NFV) and Cloud-Edge-Fog Computing driving an unprecedented techno-economic shift in the Telecom and ICT industries.	https://netsoft2021.ieee-netsoft.org/about/
	IFIP/IEEE International Symposium on Integrated Network Management	Aims to capture recent results, emerging approaches and technical solutions for dealing with resilience and sustainability of network and service management in highly dynamic environments.	https://im2021.ieee-im.org/about
	International Conference on AI Applications and Innovations (AIAI)	Convers various topics such as Adaptive Control, AI Applications, Artificial Neural Networks, Cybersecurity and AI, Telecommunications – Transportation, Machine Learning and Cybersecurity, among others.	http://www.aiai2021.eu/
	IEEE 5G World Forum	Aims to bring experts from industry, academia, and research to exchange their vision as well as their achieved advances towards future networks of 5G beyond and encourage innovative cross-domain studies, research, early deployment and large-scale pilot showcases that address the challenges of future networks.	https://ieee-wf-5g.org/

Table 3: Journals, magazines and scientific conferences targeted by TeraFlow

Between January and March 2021, four (4) conference papers have been submitted and accepted for OFC 2021, and two (2) demo papers were submitted and accepted for the same conference. In addition, one (1) paper and one (1) workshop proposal were submitted and accepted for EuCNC 2021. Finally, one (1) paper was submitted to IEEE Networks. All the details about these papers will be included in upcoming deliverables, as well as the information corresponding to other publication for each reporting period at M12, M24, and M30.

2.5.5. Content Strategy

Aligned with the dissemination and communication objectives and the general objectives defined by TeraFlow on the technical and impact side, a solid content strategy will contribute to raise awareness about the project, inform external audiences of the progress, milestones and results achieved, and generate interest to boost the uptake of the project outcomes by multiple stakeholders.

2.5.5.1. Press Releases and News

The development of press releases will continue throughout the life of the TeraFlow project as they are one of the most effective means of communicating the beginning, progress, and updates of the project. During the project, different press releases will be launched, published on the project website, and highly promoted on social media channels from the project and partners. TeraFlow will also make use of 5G-PPP communication and dissemination to reach wider audiences.


TeraFlow

EU-funded project TeraFlow to develop a novel and secure cloud-native SDN controller for beyond 5G networks

Due to its multiple benefits, the technologies developed during the 30-month project mainly target telecom operators, edge and hyperscale cloud providers

Castelldefels, Spain. February 11, 2021. TeraFlow project, funded by the European Commission under Horizon 2020 Programme, officially started on January 1st as part of the 5GPPP Phase 3 projects working on the topic of Smart Connectivity beyond 5G. The project aims to build a new type of **secure cloud-native SDN controller** that will drastically transform Beyond 5G (B5G) networks by integrating current **NFV and MEC** frameworks and revolutionary features for **flow management** at the service layer, and **optical/microwave network equipment integration** at the infrastructure layer. On top of that, **TeraFlow** envisions to enhance the security of its controller by using **Machine Learning** (ML) and **forensic evidence** for multitenancy based on Distributed Ledgers.

In a context where the networks are exponentially increasing due to 5G, 3GPP releases and upcoming B5G networks, there is a latent need for massive flow management combined with advanced automation capabilities as human management and operation of the networks will become more challenging. However, even when Software Defined Networks (SDN) have the capabilities to fulfil those requirements, current SDN controllers have limitation in terms of flow aggregation and software architecture, which at the same time influences the slow adoption of basic SDN deployments from networks operators.

To tackle all these challenges, TeraFlow proposes an architecture for a cloud-native SDN controller aiming at capabilities and deployments for B5G with high levels of reliability, redundancy and security built upon three main pillars: autonomous networks and compute integration, trusted multi-tenancy, and ML-based cybersecurity.

Consequently, TeraFlow architecture is based on container-based services deployed as microservices and managed on elastic infrastructures through agile DevOps process and continuous delivery workflows for providing benefits such as:

- Self-healing properties due to the constant monitoring of microservices and their restart in case of failure
- Auto-scaling, allowing monitor microservices' resource consumption and scaling horizontally in case of overload
- Load balancing for replicated microservices
- Automated rollbacks allowing a declarative network status description for additional network programmability benefiting network operators

TeraFlow OS will be validated on three scenarios: Autonomous Networks B5G, Automotive and Cybersecurity.

The project is **coordinated by the Centre Tecnològic de Telecomunicacions de Catalunya (CTTC)** and brings together other 13 partners from 8 countries with different areas of expertise for the development of TeraFlow OS and other relevant tasks for experimental implementation and demonstration of prototypes, collaboration with Standard Defining Organisations and Open source software community, 5GPPP, and the definition of a sustainability roadmap for the results generated.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101015857

The partners are Telefónica Investigación y Desarrollo (Spain), INFINERA (Finland), SIAE Microelettronica (Italy), NEC Laboratories (Germany), Atos (Spain), Telenor (Norway), Chalmers University (Sweden), Universidad Politecnica de Madrid (Spain), Volta Networks (Spain), Norwegian University of Science and Technology - NTNU (Norway), UBITECH (Greece), Peer Stritzinger (Germany) and Old Dog Consulting (UK).

Quotes:

"TeraFlow will have a strong impact on how SDN controllers are currently defined and implemented. We expect to lead a new era of innovation in software defined networks and foster a new generation of SDN controllers" **Ricard Vilalta**, *Senior Researcher at CTTC and TeraFlow Project Coordinator.*

"Telefónica's IFUSION strategy is designed to create a highly agile and cost-efficient transport network to support today's traffic demands, as well as beyond 5G traffic volumes and use cases, such as network slicing. The large ecosystem in TeraFlow's project will help us to achieve a new and more dynamic network services and automation features validated in representative scenarios" **Victor Lopez**, *Network Evolution and Virtualisation Architect at Telefónica Investigación y Desarrollo, and TeraFlow Technical Manager.*

For more information, visit: www.teraflow-h2020.eu

Follow TeraFlow on Twitter and LinkedIn, and subscribe to its newsletter for being up to date with all the progress

About TeraFlow:

TeraFlow – Secured autonomic traffic management for a Tera of SDN flows - is an EU-funded project under the Research and Innovation programme H2020 with the Grant Agreement N° 101015857. TeraFlow will create a new type of secure cloud-native SDN controller that will radically advance the state-of-the-art in beyond 5G networks.

For further information about the project please contact TeraFlow Project Coordinator, Ricard Vilalta, CTTC: ricard.vilalta@cttc.es, and for any media/dissemination enquiries contact TeraFlow Communication Manager, Ana María Morales, Atos Spain: ana.maria.morales@atos.net

Figure 16: TeraFlow 1st Press Release

An important part of the process is the commitment of partners which is reflected in the publication of press releases on their website, the translation and adaption of official versions to local language and issuing them to local media. This process will lead to benefits such as an increase in click rates and referrals that will generate a positive impact on the strategy.

Press releases will also be shared with key technical media in the fields of telecommunications, ICT, networks, innovation, and other related topics covered by TeraFlow to give visibility to the project among target audiences.

The first press release (https://www.teraflow-h2020.eu/news/1st-official-press-release) of the project (Figure 16) was published and shared with external audiences on February 11th, 2021. This press release presents the project motivations, objectives, and expected outcomes. Other press releases are foreseen to be developed to communicate the availability of TeraFlow OS releases, the results on validation scenarios, and the end of the project.

Other types of news pieces that will be published regularly on the website, and promoted through social media channels, will be related to the participation of the project at external events or the organisation of events and workshops by the project in order to attract participants. Another activity

communicated through news entries are the project meetings and internal activities that are worth sharing externally to demonstrate the progress on the technical side.

As mentioned, the publication of project-related information either on media, partners websites, or other external websites is considered and will be reported in upcoming deliverables, as this also contributes to the link building strategy considered on the project website to enhance its positioning in search engines. Between January and March 2021, the following publications have been achieved:

Type	Title	Link
Partner Website	TeraFlow - Secured autonomic traffic management for a Tera of SDN flows	https://booklet.atosresearch.eu/project/teraflow
Partner Website	UBITECH kicks off the TeraFlow Research and Innovation Action on Secured Autonomic Traffic Management for a Tera of SDN flows	https://ubitech.eu/ubitech-kicks-off-the-teraflow-research-and-innovation-action-on-secured-autonomic-traffic-management-for-a-tera-of-sdn-flows/
External Website	EU-funded project TeraFlow to develop a novel and secure cloud-native SDN controller for beyond 5G networks	https://cordis.europa.eu/article/id/429114-eu-funded-project-teraflow-to-develop-a-novel-and-secure-cloud-native-sdn-controller-for-beyo
Partner Website	EU-funded project TeraFlow to develop a novel and secure cloud-native SDN controller for beyond 5G networks	https://booklet.atosresearch.eu/press-releases/eu-funded-project-teraflow-develop-novel-and-secure-cloud-native-sdn-controller
Partner Website	CTTC leads a new project. Smart connectivity services to B5G networks	http://www.cttc.es/teraflow/
External Website	TeraFlow Project page	https://5g-ppp.eu/teraflow/
Partner Website	Volta Networks joins TeraFlow to foster enhanced network management for large scale networks	https://voltanet.io/volta-networks-joins-teraflow/
Partner Website	TeraFlow Project page	http://www.cttc.es/project/teraflow-secured-autonomic-traffic-management-for-a-tera-of-sdn-flows/
Media	TeraFlow project aims to foster a new generation of SDN controllers	https://www.telecomtv.com/content/cloud-native/teraflow-project-aims-to-foster-a-new-generation-of-sdn-controllers-40829/
Partner Website	TeraFlow: next step in telecom operators' quest for open, virtual, and automated networks	https://voltanet.io/teraflow-next-step-in-telecom-operators-quest-for-open-virtual-and-automated-networks/
Media	EU Has Granted Over €95 Million in Funding for 6G Research	https://www.6gworld.com/exclusives/eu-has-granted-over-e95-million-in-funding-for-6g-research/
Partner Website	Networking Research Group	https://www.ntnu.edu/iik/networking#/view/projects
Partner Website	Secured autonomic traffic management for a Tera of SDN flows (TeraFlow)	https://research.chalmers.se/en/project/10060

Table 4: TeraFlow information @Media, Partners Website and others

2.5.5.2. Newsletters

Allowing target audiences to subscribe to our mailing list has a two-fold benefit since it allows people to receive frequent information about the project through the newsletter and/or specific emails to communicate the launch of press releases, blog posts or other relevant information related to events organised by the project.

The TeraFlow bi-annual newsletter will be a key marketing tool to gather leads and reach interested stakeholders with relevant information about the progress of the project and hence, generate awareness about the motivation and results obtained while also promoting participation in events, the publication of papers, among others. The structure of each newsletter will be:

- WP progress → Short articles highlighting the main progress and achievements of each WP and the next steps to be followed
  - WP2 – Use cases, requirements, architectures, business models analysis and data models
  - WP3 – Life-cycle automation and high performance SDN components
  - WP4 – Network security and interworking across B5G networks
  - WP5 – Prototype integration, demonstration, and validation
  - WP6 – Standardisation, dissemination and exploitation
- Special Articles / Interviews → Just for issues covering releases of the TeraFlow OS or finished milestones
- Publications → Latest scientific papers and blog posts published
- Events → Latest events where TeraFlow was present
- TeraFlow partners → Organisation profile, role within the project and the team behind of 3 featured partners each issue

Additional sections will be added if needed to deliver relevant content to external audiences.

As shown in Figure 13, a newsletter template has been created following the branding guidelines of the project. After generating a PDF version, we will use the tool Flipsnack to generate a digital flipbook which will be embedded into the newsletter section on the project website. Using the tool Mailchimp, a marketing automation platform to leverage email marketing, we will create a custom email template to send a summary of the main sections of the newsletter and redirect the traffic to the embedded flipbook on the project website. With this process we will be able to increase the traffic and average time spent on the website and provide access to the main newsletter to people that haven't subscribed yet or who were informed about the latest issue through the dedicated social media campaign that will be done for each issue.

TeraFlow will also leverage partners' internal and external newsletters to amplify the reach and raise awareness about the project. Also, the publication of related information about the project in the 5G-PPP newsletter and newsflashes will be an important channel to promote information about the project.

The first issue of the TeraFlow newsletter is planned for June 2021, nevertheless, a special social media campaign is running to encourage people to subscribe to it. Between January and March 2021, TeraFlow has been featured in newsletters as shown in the table below:

Source	Title	Link
Atos Research and Innovation Newsletter – Internal	TeraFlow Project has its Kick-off Meeting	Internal only
Chalmers Newsletter - Department of Electrical Engineering - E2 News	New H2020 project on Smart Connectivity beyond 5G	https://ui.ungpd.com/Issues/1e6e2ab8-934a-40e4-aba0-252388e40e57
5G-PPP Newsflash – January 2021	5G-PPP Phase 3, Part 6 projects started in January 2021	https://5g-ppp.eu/newsflash-january-2021/
NGINO Network Newsletter	PROJECT ACHIEVEMENT	https://www.ntnu.edu/documents/1274239018/0/Newsletter+NGINO+October+-2020.pdf/c82218b2-a9d7-1fce-9bd7-dd1a7386d9d9?t=1602766316404
5G-PPP Newsflash – March 2021	5G-PPP Webinar: Europe accelerates towards 6G	https://5g-ppp.eu/newsflash-march-2021/#lien2 → See article: https://5g-ppp.eu/event/5g-ppp-webinar-europe-accelerates-towards-6g/

Table 5: TeraFlow @Other newsletters

2.5.5.3. Blog Posts

With the aim of providing thought leadership on the various topics and technologies covered by TeraFlow, a series of Blog posts every two months will start running from Summer 2021 until the end of the project. Through this initiative, we will also strengthen the personality of the project and connect with external audiences in a creative and informative way. Different formats such as articles or interviews are foreseen in order to provide relevant and innovative content.

The blogs posts will be published on a specific section of the website, and highly promoted through emailing and social media not only from the project, but also from the partners, 5G-PPP, and potentially, other related projects.

Some of the topics identified so far are:

1. Interview with Project Coordinator
2. Interview with Technical Coordinator
3. TeraFlow architecture
4. TeraFlow micro-services
5. Validation Scenarios: B5G, Automotive, and Cybersecurity
6. Cloud-native SDN
7. Testbeds set up for each scenario
8. TeraFlow OS v1
9. TeraFlow OS v2
10. TeraFlow OS v2.1
11. Adoption of SDN by telecom operators
12. Integration with telco cloud and Multi-access Edge Computing

2.5.6. Events and Workshops

Participating in external events and organising our own TeraFlow events and workshops is an essential element of TeraFlow's dissemination and communication strategy. Leveraging existing and planned events will ensure a great impact and engagement with key target audiences and potential end-users of the project results. On the other hand, the organisation of events and workshops contributes to raising awareness about the project.

The participation in clustering and events organised by the 5G-PPP will be used to exchange knowledge, results and experiences with related projects, and to communicate the progress at the European level. This is aligned with the efforts and activities within T6.2 "Standardisation and open source activities", and T6.4 "Liaison activities and 5G-PPP collaboration."

Section 2.5.4 Journal Publications and Scientific Papers of this deliverable already presents a list of conferences that will be targeted throughout the life of the project for the submission and presentation of scientific publications. Nevertheless, the events described in this section refer to the ones with a greater commercial, business, and industrial profile. Hence, the participation within these events has the aim to engage with stakeholders and promote the uptake of the project results, rather than only presenting innovation and progress made within the project. In this sense, organisation of workshops in industry events and demo sessions will be one of the key elements at the end of Phase 2 and during the whole of Phase 3.

Table 6 presents a list of strategic events identified so far by the Consortium and individual partners for potential participation and/or representation of TeraFlow members for supporting the project communication and dissemination activities. The format can vary from presentation, invited talks, panels, workshops, booth, demo session, webinars, etc. The inclusion of an event in this table does not represent a confirmed attendance, as the participation will be decided taking into consideration various external factors and the progress of the technical results.

Event	Description[4]	Link
Open Networking & Edge Summit	Formerly Open Networking Summit, is the industry's premier open networking event now expanded to comprehensively cover Edge Computing, Edge Cloud & IoT. Open Networking & Edge Summit North America enables collaborative development and innovation across enterprises, service providers/telcos and cloud providers to shape the future of networking and edge computing.	https://events.linuxfoundation.org/archive/2020/open-networking-edge-summit-europe/
Layer 1-2-3 SDN/NFV World Congress	An event dedicated to network transformation technologies and the applications they power. Its agenda covers all areas of network transformation and service evolution in telecoms and networking - not just SDN and network virtualization, but 5G, IoT, smart orchestration, network automation, and the whole range of exciting developments	https://congress.layer123.com/event/c7ecb486-321f-4812-a554-4cfbd529a159/summary

[4] Description taken from each event website

	and applications we are seeing across the market.	
Mobile World Congress (MWC)	World's most influential exhibition for the connectivity industry, gathering in 2019, up to 2,400 exhibitors, 8,000 CEOs and 59% of the industries' most important decision makers.	https://www.mwcbarcelona.com/
4YFN	The startup event of the world's largest exhibition for the mobile industry, GSMA MWC. The goal is to support startups, investors and companies to connect and launch new business ventures.	https://www.4yfn.com/about/
FutureNet World	Bringing the telecoms industry together to discuss strategic and commercial priorities in today's digital world and the considerations for the future of the network.	https://www.futurenetworld.net/about/
Code Beam STO	A conference built on the long-standing legacy of the Erlang User Conferences. An event all about discovering the future of the Erlang Ecosystem and bringing together developers as a community to share knowledge & ideas, learn from each other and inspire to invent the future.	https://www.eventbrite.co.uk/e/code-beam-v-europe-2021-tickets-148774286897?aff=ebdssbonlinesearch
MPLS+SDN+NFV/AInet World Conference	Emphasis will be given to network programming (programmability, functions on demand), 5G, SR and Self-Healing networks (service assurance, closed loop automation, intent-based).	https://www.uppersideconferences.com/mpls-sdn-nfv/
5G Expo World Series	The world leading enterprise technology conference series bringing together top-level content and discussion from across the globe. The 5G Expo World Series will explore Operational 5G including top level content and discussion covering topics such as 5G latency – network slicing – Enterprise benefits and challenges – collaborating 5G – IoT & Blockchain – Big Data & AI in 5G – the future of cybersecurity.	https://www.5gexpo.net/
Big 5G Event	One of the largest events bringing together operators and enterprises to develop strategies for digital transformation.	https://tmt.knect365.com/big-5g-event/
5G World Summit	Co-located with Global Carrier Billing Summit, bringing the entire direct carrier billing ecosystem together – CSPs, merchants, vendors, content providers, platforms and more.	https://tmt.knect365.com/5gworldevent/
FUTURECOM	Main technology, innovation and digital transformation event which combines presentations, debates and	https://www.futurecom.com.br/en/home.html

	demonstrations on the impact of applying disruptive technologies in different segments of the economy, with hyper-connectivity infrastructure as the main inductor and enabler of this transformation.	
WISPAPALOOZA	WISPA largest event bringing together 2000+ individuals to celebrate the wireless Internet service provider ecosystem.	https://www.wispa.org/wispapalooza_2020.php
OCP Global Summit	Brings together more than 3,600 key decision makers, executives, engineers, developers and suppliers to help grow, drive and support the open hardware ecosystem in, near and around the data center and beyond.	https://www.opencompute.org/summit/global-summit
6G Summit	Originated from the 6G Flagship programme in Finland and now part of the EuCNC.	https://www.eucnc.eu/
NGON & DCI World	Brings together the optical network industry to take stock of new technology launches and translate the latest innovation into practical integration strategy.	https://tmt.knect365.com/next-generation-optical-networking/
TIP summit	Organised by the Telecom Infra Project, brings together service providers, technology providers, systems integrators, start-ups, investors, analysts and a wide variety of other ecosystem partners.	https://telecominfraproject.com/
European 5G Conference	European 5G Conference has an established reputation as Brussels' leading meeting place for discussion on 5G policy.	https://5gconference.eu/
5GForum	First multidisciplinary meeting on 5G technology to be held in Spain. The 5G FORUM annually puts the advances of 5G technology on the stage, constituting an opportunity to exchange knowledge of the practical applications of this technology.	https://www.5gforum.es/en/
AI & Big Data Expo World Series	Exhibition that showcases the next generation enterprise technologies and strategies from the world of Artificial Intelligence & Big Data, providing an opportunity to explore and discover the practical and successful implementation of AI & Big Data to drive your business forward	https://www.ai-expo.net/

Table 6: Events targeted by TeraFlow

It is important to mention that participation in physical events will depend on the evolution of the COVID-19 pandemic. At least for Phase 1, until December 2021, it is foreseen that participation will be only in virtual events for safety reasons and because all events are offering virtual or hybrid formats.

Regarding the organisation of events and workshops, more details about this will be reported in future deliverables since these are expected to take place once there are more mature results on the technical side. Between January and March 2021, TeraFlow has been featured in five (5) events:

Event Name	Venue	Date	Description	Link
3rd ONFIRE Symposium	Virtual	2/24/2021	Presentation "Optical white boxes design and programmability adopting GNPy" by Victor Lopez from Telefónica	https://www.teraflow-h2020.eu/events/3rd-onfire-symposium
TIP OOPT MUST: Operators Driving SDN for Transport Adoption and Acceleration	Virtual	*3/3/2021*	Presentation of work related to TeraFlow by Victor Lopez from Telefónica. This event formally introduced the TIP OOPT MUST subgroup, providing a view to the optical industry what this subgroup will achieve.	https://www.teraflow-h2020.eu/events/tip-oopt-must-operators-driving-sdn-transport-adoption-and-acceleration
OSM Ecosystem Day	Virtual	10/3/2021	TeraFlow in the OSM ecosystem by Dr. Ricardo Martínez, Senior Researcher, CTTC This presentation tackles the adoption and integration of the OSM within the Teraflow project solution.	https://www.teraflow-h2020.eu/events/osm-ecosystem-day
5G-PPP Webinar: Europe accelerates towards 6G	Virtual	16/03/2021	TeraFlow is one of the participating projects, represented by Ricard Vilalta, Project Coordinator and Senior Researcher at CTTC.	https://www.teraflow-h2020.eu/events/5g-ppp-webinar-europe-accelerates-towards-6g
MASTEAM Seminar	Virtual	18/03/2021	Ricard Vilalta presented TeraFlow at a talk to the master's students in Applied Telecommunications and Engineering Management from Universidad Polytechnical de Catalunya - Castelldefels School of Telecommunications and Aerospace Engineering (EETAC)	https://www.teraflow-h2020.eu/events/presentation-software-define-control-optical-networks-upc-eetac

Table 7: Participation of TeraFlow in events between M1 - M3

2.6. Key Performance Indicators (KPIs)

To measure the success and effectiveness of the strategy presented in this deliverable, Key Performance Indicators (KPIs) have been established. These will be carefully monitored monthly to identify any adjustment or additional action that must be put in place to achieve the objectives and KPIs.

Table 8 summarises the Key Performance Indicators (KPIs) included to guarantee a good impact of the activities. These were defined considering the metrics included in the proposal. Nevertheless, some of them were increased to present a more realistic overview of what can be achieved considering the strategy and resources available.

Type	KPI	Total Target by M30	Achieved by M3
Website	Unique Visitors	5000	941
	Average time	2:00	1:00
	Page Views	10000	1682
	Blog and News entries	20	2
Twitter	Tweets	360	28
	Retweets	800	80
	Likes	1500	176
	Followers	250	100
	Engagement rate	≥ 1.2%	1.5%
	Impressions	100k	21,6k
LinkedIn	Page views	2000	170
	Visitors	400	82
	Reactions	≥ 1.2%	3%
	Followers	100	47
Marketing Material	PPT - Scientific/technical dissemination material	3	1
	Brochure	3	0
	Videos	2	0
	Press Releases	3	1
	Newsletters	5	0
Scientific Dissemination	Scientific Publications	25	9
	Articles in specialised magazines/journals	10	0
	Posters	5	0
Events	Workshops organised	2	0
	Attendees to the Project workshops	25	0
	Demo events	10	0
	Events and presentations where the project will be presented	20	5

Others	Liaisons and joint activities with other projects, communities, initiatives, etc (e.g., website links, workshops, newsletters, social media, etc.)	20	2

Table 8: TeraFlow Dissemination and Communication KPIs

2.7. Individual Communication and Dissemination Plans

2.7.1. Centre Tecnologic de Telecommunications de Catalunya (CTTC)

CTTC as an academic partner will disseminate its scientific and technological research outcomes through international peer-reviewed conferences such as IEEE NFV/SDN, IEEE Network Softwarization, Open Networking Summit, Layer 1-2-3 SDN/NFV World Congress, OFC, ECOC, etc. High-impact factor journals and magazines will be also targeted by CTTC such as IEEE Communications Magazine, IEEE Networks Magazine, IEEE/OSA Journal of Optical Communication and Networks.

CTTC will communicate the attained results through regular CTTC channels including press releases, social media accounts, weekly seminars, science fairs, and students' visits. The project awareness will be promoted by the presence in large scale congresses such as Layer 1-2-3 SDN World Congress and Mobile World Congress. Moreover, ETSI Plugfests will also be addressed for communication of TeraFlow concepts and solutions towards the Software Network community.

2.7.2. Chalmers Tekniska Hoegskola (CHAL)

Chalmers will implement the following dissemination strategy to promote the project's results and ensure its visibility and acknowledgment within Europe and the global ICT research community. We will disseminate the project results through several publications in leading international journals, tier-1 conferences, and workshops. We will plan contributions and participation at flagship international conferences, such as OFC, ECOC, ICC, GLOBECOM, INFOCOM, SDN conferences, and other prestigious IEEE, ACM, and IFIP events. We will facilitate the organization of workshops and journal special issues. We will also organize dissemination events (both local and co-located with international conferences) where the results of TeraFlow will be showcased and discussed with other international experts invited to the event.

2.7.3. Universidad Politécnica de Madrid (UPM)

UPM as an academic partner plans to present early findings and consolidated research results of the project to the scientific community in the form of publications in top-tier scientific journals and peer-reviewed conferences.

Presenting results at academic and industry conferences and workshops will help disseminate TeraFlow knowledge and demonstrate key innovations. Major international and national conferences such as EUCNC, IEEE International Conference on Machine Learning and Applications (ICMLA), GLOBECOM, SIGCOMM, IEEE Security & Privacy, ACM Conference on Computer and Communications Security will be targeted. Academic publications will be key for highlighting scientific and industry technology leadership. Publications will be placed in repositories enlisted in Open AIRE (Open Access Infrastructure for Research in Europe) in an electronic copy at the latest upon publication. In addition, publications in open access journals will be pursued, such as IEEE Transactions on Information Forensics and Security, IEEE Transactions on Pattern Analysis and Machine Intelligence, IEEE security and privacy, IEEE Communication Magazine and Elsevier Computer Networks among others.

In addition, UPM will provide compilations of relevant macroscopic outcomes to be published in the project's website and social networks in order to reach a greater audience.

2.7.4. Norges teknisk-naturvitenskapelige universitet (NTNU)

NTNU plans to contribute to the TeraFlow project via the following dissemination and communication activities.

- Sharing of project information and press releases via internal platforms.
- Information about the project and NTNU's contribution on the webpage of the networking group at the IIK department.
- Participating at ~5 events organized under the umbrella of IEEE Communications Society Network Operations & Management Technical Committee and ACM SIGCOMM (CNSM, IM/NOMS, NETSOFT, NETWORKING, ACM SIGCOMM, ACM CONEXT) and as well as at one event related to Telecommunications Policies.
- Submission of 4-5 papers to workshops/conferences/journals.
- Submitting a proposal for organization of a workshop for NOMS2022 supported by TERAFLOW.
- Internal NTNU workshop on multi-provider interconnect (tentatively in 2022).

Further, NTNU plans to attend the following events in 2021:

- CNSM 2021 (http://www.cnsm-conf.org/2021/)
- NETSOFT 2021 (https://netsoft2021.ieee-netsoft.org/)
- IM 2021 (https://im2021.ieee-im.org/)

2.7.5. Telefónica Investigación y Desarrollo (TID)

TID has a proven track record publishing the results of projects in conferences and journals. TID will publish its work and novel results in selected conferences on communications/networking, artificial intelligence, etc. and high impact-factor journals. Moreover, TID will also use its participation in industry events and conferences to publicize the advantages of TeraFlow solution and announce the latest releases.

TID will work from the beginning of the project to create a basic set of necessary presentation materials targeted for various audience types: all, general public, industry, research, other projects and students.

2.7.6. INFINERA (INF)

Infinera is proud to be a collaborator in the TeraFlow project. As a participating member, we are including here our marketing communication plan.

Initial Launch

Infinera will author and distribute a blog acknowledging our TeraFlow participation and outlining the goals of the project. We will also acknowledge our TeraFlow participation on our Infinera.com website.

Webinars/Events

Infinera will include TeraFlow information in at least two webinars/events where we are participating in 2021. While the specific events need to be finalized, examples include software and automation events like FutureNet World and Layer 123 World Congress.

Social Media Ongoing

As progress is made in achieving TeraFlow project goals, Infinera will utilize our corporate (as well as personal) Twitter and Linked-In accounts to amplify TeraFlow milestones, achievements, and messaging.

2.7.7. SIAE Microelettronica (SIAE)

SIAE plans for dissemination and communication include the following:

- Publication of press releases and white papers on SIAE official website (www.siaemic.it)
- Posting or reposting information and news on SIAE social media channels
- Publication of technical papers on specialized digital magazines
- Talks on webinars and digital events
- Dissemination activities and demonstration event organized within standardization activities SIAE participates to (e.g., ONF Multi-Domain Transport PoCs, ETSI mWT Plugtests)

2.7.8. NEC Laboratories (NEC)

NEC Laboratories Europe is excited to be part of TeraFlow. NEC plans to communicate and disseminate its involvement and contribution through multiple internal/external channels as described below:

- Social Media

NEC will promote its participation in TeraFlow in social media channels such as LinkedIn. To this effect, NEC has made a project announcement through a LinkedIn post: https://www.linkedin.com/feed/update/urn:li:activity:6773648441588371456%22%20/

- Internal dissemination

NEC Laboratories Europe is in constant contact with NEC's business units (e.g., operation and development of network and digital services for smart cities and digital innovations on blockchain deployments) and its external customers, where research results are presented, exchanged, and discussed.

- Academic conferences and journals

NEC Laboratories Europe aims to publish its research contributions also at highly visible academic conferences and journals; these constitute an important channel for NEC to disseminate project results in the community.

- Standards bodies

NEC is a founding member of ETSI ISG PDL (Industry Specification Group Permissioned Distributed Ledger). NEC will closely monitor standardization activities in ISG PDL and actively connect Teraflow project research results related to DLT with PDL work items.

- Open Source

The Blockchain technology developed for the distributed ledger component of TeraFlow OS (like improved consensus algorithms) will be of interest for Hyperledger Lab. Specifically the MinBFT project, which facilitates Byzantine fault-tolerant consensus with fewer consenting nodes and

less communication rounds comparing to the conventional BFT protocols. NEC is a leading contributor to MinBFT. Insights gained from MinBFT also advance NEC´s own FastBFT consensus algorithm.

2.7.9. Atos (ATOS)

Atos has large expertise in communicating and disseminating results from its research projects. Through its communication and design group, Atos Research and Innovation can provide all methods and tools for effective communication. In the context of the TeraFlow project, Atos is responsible for defining the communication and dissemination strategy as T6.1 leader and guaranteeing the maximum visibility of the project and the achievement of the KPIs established. Atos is also committed to supporting all communication/dissemination activities via online communication (social networks, press media, website, etc.), exploiting synergies with already running research projects, and support all dissemination activities carried out by the project.

For the TeraFlow project, Atos will make use of the following channels to contribute to the visibility and positioning of the project: Atos Research and Innovation monthly internal newsletter (350 recipients), Atos Research and Innovation Booklet (http://booklet.atosresearch.eu/) with more than 500 Unique Visitors per month, Atos internal weekly newsletter (1100 recipients), Atos Spain and Global Twitter and LinkedIn accounts, and Atos Research and Innovation Twitter account. In addition, Atos will publish at least one of the TeraFlow press releases on its website and issue it to Spanish and European media.

2.7.10. TELENOR (TNOR)

TNOR plans to promote and disseminate TeraFlow activities and outcomes through the following actions:

Internal dissemination

TNOR participates in TeraFlow with its research department. The technical and business outcomes of TeraFlow will be continuously updated on the internal communications channels like Workplace, which is accessible for all business units. Workshops will be organized to disseminate the achieved results or gather interest and requirements from TNOR's business units. In addition, presentations will be planned in venues for different audience groups, e.g., breakfast meeting for all TNOR employees, and colloquium for targeted audience with interest in specific topics.

Social media

TNOR will promote its participation and activities in TeraFlow via social media channels like LinkedIn.

Publications

TNOR Research will collaborate with partners and publish results in highly visible academic journals and conferences. In addition, TNOR will also contribute to relevant whitepapers and disseminate the results to the industrial audience.

Standardization bodies

TNOR is active in ETSI ZSM (zero-touch network and service management) and ETSI Open Source MANO (OSM). TNOR will closely monitor the progress of these bodies and contribute to the standardization with results of TeraFlow.

2.7.11. Volta Networks (VOL)

Volta participates in several events in Europe and in other locations of the planet that can contribute to the global dissemination of TeraFlow results. Additionally, a number of communication channels will be used by Volta for communication of the project results:

- Volta's website
- Outbound programs with strategic partners such as Light Reading and HIS
- Social media channels such as LinkedIn and Twitter
- Public relations activities, including Press Release and Media Briefings with key editors from industry publications such as Fierce Telecom, Light Reading, Lightwave, PacketPushers, and more.

2.7.12. Ubitech (UBI)

UBITECH will promote and disseminate TeraFlow and its components through a variety of internal and external channels, as described below:

Internal Dissemination

UBITECH participates in TeraFlow with the Network Softwarization and Internet of Things (NSIT) research and development group. The technical achievements of TeraFlow along with any upcoming proof-of-concept demonstrations will be constantly communicated towards UBITECH's business departments, especially those providing Cloud and Networking solutions.

Social Media and Corporate Web Presence

UBITECH has active communication through LinkedIn where major research achievements are announced. The TeraFlow project announcement can be found at this LinkedIn post. Moreover, UBITECH maintains a corporate web site, where the news portal is regularly updated with relevant information, while all major project outcomes are reported. This post at UBITECH's news portal advertises the TeraFlow kick-off meeting.

Standardization Bodies

UBITECH participates in 5G-PPP Technical Board and has contributed to the architecture white paper and targeted KPIs evaluations. UBITECH will be constantly monitoring relevant standardization activities in 5GPP in order to grasp the opportunity to connect TeraFlow's research results with relevant work items.

Open-source Communities

UBI will raise open-source community awareness about TeraFlow through contributions to popular SDN and NFV initiatives, such as ONF's ONOS and the Click modular router.

Academic Conferences/Workshops and Journals

UBITECH aims to raise the research community's awareness through publications to research conferences (e.g., ACM Symposium on SDN Research or ACM Symposium on Cloud Computing), workshops (e.g., USENIX HotCloud), and/or topic-specific journals.

2.7.13. Peer Stritzinger (STR)

Peer Stritzinger GmbH, as an industrial partner of the TeraFlow project, is proud to participate in the dissemination of the group progress through its available channels.

Social Media

Peer Stritzinger GmbH will include TeraFlow in its social network communication strategy by promoting the progress of the group through Twitter, blog posts, webinars, and video content.

Corporate

The TeraFlow project will be showcased on the Peer Stritzinger GmbH corporate website. The group announcements and progress will be reflected there, as well as regular updates on our active participation in the project.

Software Community

As an active member of the Erlang Ecosystem Foundation (erlef.org), Peer Stritzinger GmbH will advocate for the TeraFlow project. Part of the work done for TeraFlow will be released as open-source software with clear mentions of the project.

Events and Conferences

In 2021, Peer Stritzinger GmbH proposed a talk about its work in TeraFlow to the Code Beam STO conference that is still pending for admission. Multiple proposals to other conferences both inside and outside the Erlang ecosystem are currently being evaluated. Peer Stritzinger GmbH intends to give lightning talks about the group work in the various conferences attended during the year.

Industrial Partners

Peer Stritzinger will communicate with its partners about the progress of TeraFlow, and how the results could impact their business and strategic decisions.

2.7.14. Old Dog Consulting (ODC)

As standardisation experts, ODC will assist project partners with ideas and proposals for various standards organisations. Our focus will be on the IETF, MEF, ITU-T, and ONF, where we have many years of experience and different leadership roles. ODC will also be responsible for proposing new ideas and demonstrating TeraFlow thought leadership. As native English speakers, the ODC participants will be supporting TeraFlow with final reviews of deliverable documents and critical publications. Highlighted below are areas where we will provide specific contributions:

Internal Dissemination

ODC will provide updates on essential standards related to TeraFlow and suggestions for project dissemination and contributions. ODC will also offer ideas for project coordination of the exploitation and dissemination activities.

Social Media and Corporate Web Presence

ODC are prolific users and consumers of various social media channels, including Twitter, YouTube, LinkedIn, and ResearchGate. ODC will use these channels during the project for dissemination and highlighting key project achievements and ideas.

Standardisation Bodies

ODC participates in various Standardization Development Organisation (SDO) activities, including 5G-PPP, IETF, MEF, ITU-T, and ONF. ODC will lead various proposals and provide TeraFlow members assistance as required.

Open-source Communities

ODC has worked on and supported multiple open-source projects in the past and will be seeking to help and work on TeraFlow open-source opportunities.

Academic Conferences/Workshops and Journals

ODC will work on academic proposals that bridge the gap between research and commercialisation. ODC will develop industry-relevant academic journals and papers, especially related to the state of standardisation and current-art, where TeraFlow is leading technical discussion and direction.

3. Standardisation and Open-Source Contributions

In this section, we cover the specific plans to generate impact in Standardisation and Open-Source communities.

3.1. Standards

Besides fostering collaboration with the standardisation bodies, TeraFlow will also take part in relevant working groups, and other relevant industry fora, putting effort into contributing with relevant documentation and research results. Active partners have been identified and led by TID in T6.2. As each standardisation body has a very specific way of operating and coordinating activities, all partners will share their experience and create a communication procedure to exchange future meeting agendas and active work items in place, in order to ensure that suitable contributions are identified during the project and relevant content is prepared in due time.

3.1.1. ETSI ISG PDL

Members: NEC Europe Ltd. (Brigitta Lange), TID (Diego Lopez), ODC (Daniel King).

The ETSI ISG PDL (Industry Specification Group Permissioned Distributed Ledger) group targets the utilisation of blockchain technologies for the creation of open and trustworthy ecosystems of industrial digital solutions and contributing to the group's working items and reports on challenges, concepts, and features related to the operation of permissioned distributed ledgers.

The TeraFlow project is already part of the **PDL work items MI/PDL007** Research Landscape and **GR/PDL-008** Research and Innovation Landscape where NEC is rapporteur.

NEC, TID, ODC, and CTTC plan to participate in the **PDL Proof of Concept** campaign with TeraFlow and associated research partners based on Scenario 2: Automotive.

NEC plans to discuss the new blockchain use cases arising from TeraFlow and the project's architectural design decision for distributed ledgers within this group. The TeraFlow project will provide new use cases to the group, including their requirements and challenges. Brigitta Lange from NEC Laboratories Europe is actively participating in ETSI ISG PDL as a delegate of NEC Europe Ltd.

TID chairs the group and is planning to contribute on smart contract applicability to network management and auditability, and to the issues related to multi-ledger interactions.

ODC will support the activities of NEC and TID with reviews and discussions of the work and will assist with forming strategies to ensure that TeraFlow objectives are met.

3.1.2. ETSI ISG ZSM

Members: TID (Diego Lopez), CTTC (Ricard Vilalta), ODC (Daniel King), TNOR (Min Xie).

The ETSI Zero-touch network and Service Management (ZSM) Industry Specification Group (ISG) applies modern principles in its low-touch management framework for 5G end-to-end automation.

The ISG ZSM is currently working on the specification of solutions and management interfaces for the orchestration and automation of the emerging end-to-end network slicing technology (GS ZSM 003) as well as of the end-to-end, cross-domain service orchestration and automation (GS ZSM 008).

TeraFlow plans to bring results in transport network automation based on the work in scenario 1 Beyond 5G networks. We are studying the feasibility to run a Proof-of-Concept based on ZSM006-PoC Framework.

3.1.3. ETSI mWT ISG

Members: SIAE

Industry Specification Group on Millimetre Wave Transmission (mWT ISG) will facilitate the use of the V-band (57-66 GHz), the E-band (71-76 & 81-86 GHz) and, in the future, higher frequency bands (up to 300 GHz) for large volume backhaul and fronthaul applications to support mobile network implementation, wireless local loop and any other service benefitting from high-speed wireless transmission. The specific study items are related to TeraFlow activities:

- WI#24 Wireless Transport Profile for Standard SDN Northbound Interfaces.
- WI#25 Wireless Backhaul Network and Services Automation: SDN SBI YANG models.

Within these activities, SIAE will try to promote relevant outcomes from TeraFlow for a possible standardization roadmap.

3.1.4. Telecom Infra Project

Members: Telefónica (Victor López, Juan-Pedro Fernández-Palacios)

The Telecom Infra Project (TIP) works to accelerate the development and deployment of open, disaggregated, and standards-based technology solutions that deliver the high-quality connectivity. The Open Optical & Packet Transport group is a project group within Telecom Infra Project that works on the definition of open technologies, architectures, and interfaces in Optical and IP Networking.

The main objective of MUST (Mandatory Use Case Requirements for SDN for Transport) is to accelerate and drive the adoption of SDN standards for IP/MPLS, Optical and Microwave transport technologies.

TeraFlow has contributed and will follow-up on the description of use case requirements for SDN for Transport for IP/MPLS [2], Optical [3] and Microwave transport technologies.

3.1.5. ONF

Members: TID (Arturo Mayoral), SIAE (Roberto Servadio, Danilo Pala), CTTC (Ramon Casellas, Ricard Vilalta), ODC (Daniel King).

The Open Transport Configuration & Control (OTCC) project aims to promote common configuration and control interfaces for transport networks in SDN, defining these interfaces with open-source software and software-defined standards. It includes the following TeraFlow-related sub-projects: Transport API and 5G xHaul.

The Transport API (T-API) project is focusing on building TAPI 2.3, with input from Telefonica on new use cases on connectivity and OAM and alarming. TR-547 is an ongoing document with TeraFlow contributions with Ramon Casellas (CTTC) as editor. Current work since the beginning of the project has been focused on description of ODU use cases and path computation drawbacks analysis.

5G xHaul (formerly known as "Wireless Transport") working group involves the definition and upgrade of interfaces/models for microwave transport, and in the Transport API (TAPI) working group. As a result of the TeraFlow efforts, some of the existing interfaces/models might be improved or new ones might be created. In case such outcomes get considered by the consortium for a possible standardization, SIAE will promote in ONF a roadmap for the definition of information/data models regarding transport network slicing in 5G and beyond-5G.

3.1.6. IETF

The Internet Engineering Task Force (IETF) is an open standards organization, which develops and promotes voluntary Internet standards. It is critical to the ongoing deployment and expansion of the Internet. If TeraFlow is successful in its IETF activities it would demonstrate the applicability and support of TeraFlow beyond the research community, as IETF standards need to be supported by a range of commercial stakeholders.

Participants: VOLTA (Dean Bogdanovic, Volta's CEO and Xufeng Liu, Volta's principal engineer for NETCONF/YANG), CTTC (Ramon Casellas and Ricard Vilalta), ODC (Adrian Farrel and Daniel King), TNOR (Håkon Lønsethagen).

It is expected that TeraFlow work will result in contributions to at least the following working groups: NETMOD (for YANG modelling), OPSAWG (for YANG models related to service delivery, such as L2NM and L3NM, and for telemetry-related activities), I2NSF (for work related to modelling and control of security functions), SFC (for consideration of how service functions can be combined to deliver functionality), TEAS and PCE (for traffic engineering and path computation work), and CCAMP (for technology specific activity, for example, optical networking). It is also expected that work may also be progressed in the Internet Research Task Force (IRTF), the research arm of the IETF.

Acknowledgement Text for IETF Internet Drafts

The following is suggested for use in your IETF Internet-Draft Acknowledgement sections:

"This work is partially supported by the European Commission under Horizon 2020 grant agreement number 101015857 Secured autonomic traffic management for a Tera of SDN flows (TeraFlow)."

Active IETF Internet Drafts

The following IDs are being actively worked on and are relevant to the project:

1. "**Challenges for the Internet Routing Infrastructure Introduced by Changes in Address Semantics**"
   URL: https://datatracker.ietf.org/doc/draft-king-irtf-challenges-in-routing/
   Lead: ODC (Dan King and Adrian Farrel)
   Status: Ongoing discussion and development
   Acknowledgement: Yes

2. "**Framework for Use of ECA (Event Condition Action) in Network Self--Management**"
   URL: https://datatracker.ietf.org/doc/draft-bwd-netmod-eca-framework/

Lead: ODC (Dan King and Adrian Farrel)
Acknowledgement: Will be added in next version.

3. "**A YANG Data model for ECA Policy Management**"
   URL: https://datatracker.ietf.org/doc/draft-ietf-netmod-eca-policy/
   Lead: VOLTA (Xufeng Liu) and ODC (Dan King)
   Acknowledgement: Will be added in next version.
4. "**Instantiation of IETF Network Slices in Service Providers Networks**"
   URL: https://datatracker.ietf.org/doc/draft-barguil-teas-network-slices-instantation/
   Lead: TID (Oscar González-de-Dios)
   Need to get acknowledgement added
5. **"A Layer 2 VPN Network YANG Model"**
   URL: https://datatracker.ietf.org/doc/draft-ietf-opsawg-l2nm
   Lead: TID (Oscar González-de-Dios)
   Need to get acknowledgement added
6. **"A Layer 3 VPN Network YANG Model"**
   URL: https://datatracker.ietf.org/doc/draft-ietf-opsawg-l3sm-l3nm/
   Lead: TID (Oscar González-de-Dios)
7. **A YANG Model for Network and VPN Service Performance Monitoring**
   URL: https://datatracker.ietf.org/doc/html/draft-ietf-opsawg-yang-vpn-service-pm
   Lead: TID (Oscar González-de-Dios)
8. **8. "A Layer 2/3 VPN Common YANG Model"**
   URL: https://datatracker.ietf.org/doc/html/draft-ietf-opsawg-vpn-common
   Lead: TID (Oscar González-de-Dios)
   Acknowledgement: Yes

Existing IETF Internet Drafts That Are Candidates for TeraFlow Involvement

a) "**YANG Data Model for Slice Policy**"
   URL: https://datatracker.ietf.org/doc/draft-bestbar-teas-yang-slice-policy/
   Lead: VOLTA (Xufeng Liu)
b) **"IETF Network Slice Controller and its associated data models**"
   URL: https://datatracker.ietf.org/doc/draft-contreras-teas-slice-controller-models/
   Lead: VOLTA (Xufeng Liu)
c) "**IETF Network Slice Use Cases and Attributes for Northbound Interface of IETF Network Slice Controllers**"
   URL: https://datatracker.ietf.org/doc/draft-contreras-teas-slice-nbi/
   Lead: TID (Luis Contreras)
d) **"IETF Network Slice YANG Data Model**"
   URL: https://datatracker.ietf.org/doc/draft-liu-teas-transport-network-slice-yang/
   Lead: VOLTA (Xufeng Liu)

3.1.7. ITU-T FG-AN

Members: ODC (Daniel King), TID (Oscar González-de-Dios)

The recent ITU-T Focus Group on Autonomous Networks was established by ITU-T Study Group 13. The Focus Group will draft technical reports and specifications for autonomous networks, including exploratory evolution in future networks, real-time responsive experimentation, dynamic adaptation to future environments, technologies, and use cases. The Focus Group will also identify relevant gaps in the standardization of autonomous networks.

The primary objective of the Focus Group is to provide an open platform to perform pre-standards activities related to this topic and leverage the technologies of others where appropriate. ODC will initially participate with the focus group and see if this is useful work and activity that the TeraFlow project can make meaningful contribution.

3.1.8. OpenConfig

Members: TID, VOLTA (Xufeng Liu).

Additional YANG models that will be generated as part of TeraFlow will also be contributed by TID and Volta to OpenConfig. To standardize TeraFlow use cases and encourage wide vendor support for them.

Infinera is closely monitoring OpenConfig and contributing to its development. In TeraFlow some OpenConfig models might be validated.

3.2. Open Source Contributions

TeraFlow partners recognise open-source communities as important pillars to ensure the sustainability of the project results and uptake by third parties. Preliminary synergies with active open-source projects are identified below, indicating the contributing partners.

3.2.1. TeraFlow SDN Controller

Members: ALL

One of the key objectives of TeraFlow SDN Controller is to design and develop a new generation of SDN Controller and contribute it to the Open Source Community. Several solutions are currently being explored including the usage of micro-services and Erlang Framework. In any case, the explored solutions will lead to the release of a basic version or a fully functional SDN controller, with support for transport connectivity services, topology, and inventory. In order to allow a freemium business models, the released TeraFlow SDN Controller might not include some advanced characteristics that might be exploited in the freemium model.

3.2.2. ETSI OpenSource MANO

Members: TID (Diego Lopez), ATOS, NTNU (Katina Kravleska), CTTC (Ricard Vilalta), TNOR (Pål Grønsund).

OSM is a community that is developing an open-source Management and Orchestration (MANO) stack aligned with ETSI NFV Information Models.

WIM is the acronym for WAN Infrastructure Manager, which is a specialized system that allows connectivity to be established between different network endpoints at different NFVI-PoPs in the context of a multi-site service Wide Area Network (WAN). Following this concept, we propose that the TeraFlow SDN Controller acts as a WIM.

The WIM offers the NFV Orchestrator an abstraction of network connectivity to ease the provisioning and monitoring of the WAN. The potential collaborations with TeraFlow are within the WIM plugin for integrating TeraFlow technologies related to T4.3.

The participation of Dr. Ricardo Martínez (CTTC, T4.3 leader) in **OSM EcoSystem Day (10/03/2021)** presented the adoption and integration of the OSM within the Teraflow project solution (see Figure 15). In a nutshell, the Teraflow project aims at designing and deploying an advanced SDN operating system supporting automated and zero touch service management of heterogeneous transport technologies (IP and Optical). Such an SDN OS will be based on a cloud native architecture handling a tera of flows (IoT) and offering appealing features for multi-domain, multi-vendor, multi-tenancy, and AI-based cybersecurity solutions.

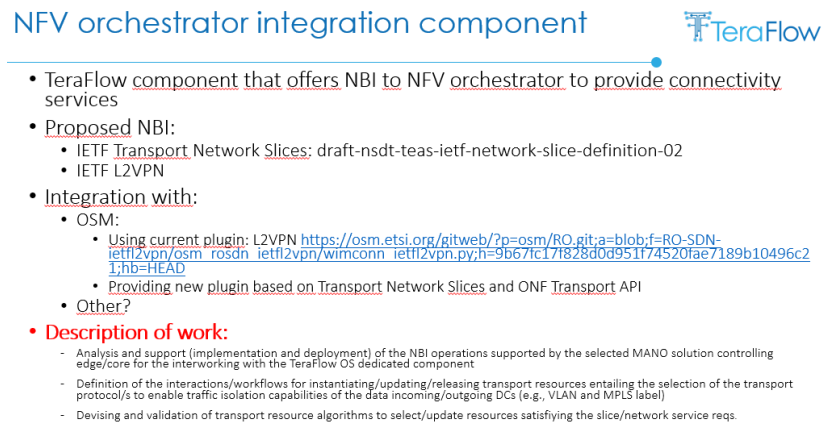

Figure 17: TeraFlow presentation at OSM Ecosystem Day (10/03/2021)

3.2.3. ONF ONOS

Members: UBI (Georgios P. Katsikas, ONOS southbound server device driver owner), CTTC (Ramon Casellas), TID (Victor López), ODC (Dan King).

TeraFlow may potentially contribute to extensions to relevant ONOS southbound device drivers and/or ONOS applications, as well as new southbound device drivers. Specifically, UBI is interested in porting P4Runtime into TeraFlow, allowing to manage P4 match-action table pipelines and their state. This could be achieved through a transparent integration between TeraFlow and ONOS with its southbound P4Runtime driver. UBI will materialize this interaction through a modern open-source high performance RPC framework (e.g., gRPC) which will fully exploit ONOS's northbound API. Additionally, UBI will investigate new southbound device drivers, currently missing from state-of-the-art controllers such as ONOS. Such an important driver is for managing edge processing devices, such as Smart NICs and/or GPUs.

The potential collaboration envisaged by CTTC and TID to ONF focuses on ODTN project as well as OpenConfig and OpenRoadm drivers and applications.

3.2.4. HyperLedger

Members: NEC (Ghassan Karame).

This project is hosted by the Linux Foundation and was created to advance cross-industry blockchain technologies.

The blockchain technology developed for the distributed ledger component of the TeraFlow OS (like improved consensus algorithms) will be of interest for Hyperledger Lab. Specifically the MinBFT project, which allows to achieve Byzantine fault-tolerant consensus with fewer consenting nodes and less communication rounds comparing to the conventional BFT protocols. NEC is a leading contributor to MinBFT. Insights gained from MinBFT also advance NEC´s own FastBFT consensus algorithm.

3.2.5. Free Range Routing (FRR)

Members: VOLTA (Fredi Raspall).

Contribution will be made to Free Range Routing (FRR), an open routing stack used by companies such as Microsoft, Orange, and Volta, that can be configured by NETCONF/YANG and therefore can be part of the type of network elements managed by TeraFlow SDN Controller. YANG models developed as part of TeraFlow will also be integrated into FRR so that all projects based on FRR will also be compatible with TeraFlow. Volta is an active contributor to FRR, with 2-3 developers at any given time.

4. Liaison and 5G-PPP Relationship

In this section we detail the participation and expected contributions to the 5G-PPP Programme, including Working Groups (WG), meaning contribution to joint program publications, to Global 5G events and joint demos, workshops, etc. to be organized at relevant events (Section 2.6 presents expected KPIs on this).

4.1. Working Groups Representatives

Partners' current involvement and participation in existing WGs is presented in Table 9.

WG	Partner
5G Architecture	TNOR
SN WG	CTTC
Security	TID
SME	UBI
5GPP PreStandards WG	ODC
Steering Board	CTTC
Technical Board	TID

Table 9: 5G-PPP Working Groups

A particularly relevant contribution to the long-term impact of TeraFlow will be contribution of the project vision and results to the ongoing structuring activities of future research programmes on Smart Networks within NGI (Next Generation Internet). TID is a founding member of the Networld2020 ETP and the 5G IA and is currently taking part in the definition of a Strategic Research and Innovation Agenda 2021-27 for future network technologies. TID, as Technical Manager of TeraFlow, will foster the adoption of the TeraFlow vision and results regarding the further convergence of software network technologies, their applicability in much denser deployments and the requisites on security and privacy, to be consolidated as part of the aspects to become part of the future Smart Networks research.

4.2. Current and Planned Activities

The following activities have been performed or are planned:

- Ricard Vilalta participated in the 5G-PPP Webinar "Europe accelerates towards 6G" on 16/03/2021.

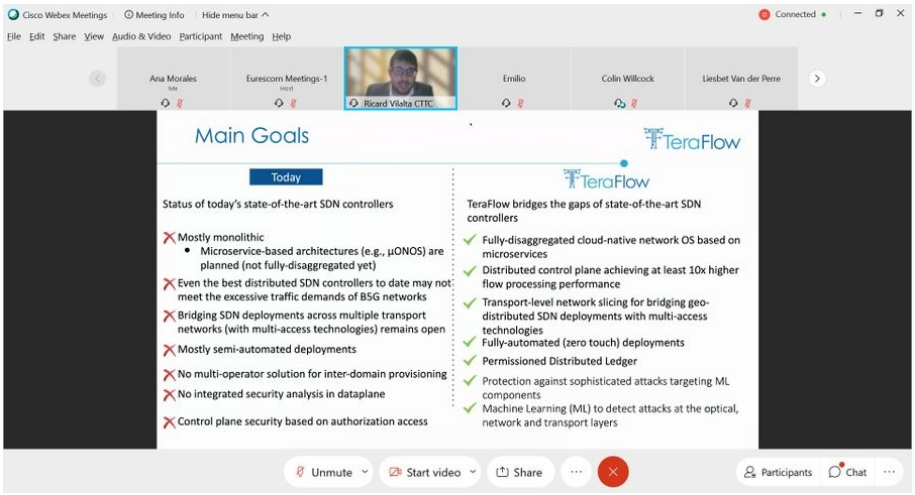

Figure 18: TeraFlow participation in 5G-PPP Webinar

- Participation in elaboration of material for ICT-52 projects dissemination (i.e., brochures, leaflets, websites).
- Preparation of EUCNC 2021 research paper on TeraFlow use cases.
- Preparation of possible contributions to the following workshop proposals:
    - Architectural Evolution toward 6G Networks
    - Pioneering Autonomous Network Management for the 6G era
    - From 5G to 6G Automated and Intelligent SecuriTy: FAST

5. Conclusions and Next Steps

This document provides the dissemination and communication strategy to be implemented by T6.1, and details the framework for communicating the project concept, objectives, and results. All partners will actively contribute to these activities as it is described on each individual plan, to maximise TeraFlow's impact among key target audiences, contribute to standardisation bodies, open source community and actively interact with 5G-PPP community and projects.

The deliverable outlines the plans and, in some cases, reports on the first metrics achieved in the first three months of the project in the case of website, social media, submission and acceptance of scientific papers at conferences and journals, among others things, where the activity has already started. Other activities and tactics will be set in place according to the strategy phases and expected impact of each one as the technical work progresses.

A complete report of the activities executed, and the progress of the plans will be presented in further deliverables:

- D6.2 – Market and business opportunities analysis and intermediate report on Dissemination, Communication, Collaboration and Standardisation (M12)
- D6.4 – Final report on Dissemination, Communication, Collaboration, Standardisation and Exploitation (M30)

References

[1] Vilalta R, de la Cruz JL, López-de-Lerma AM, López V, Martínez R, Casellas R, Muñoz R. uABNO: A Cloud-Native Architecture for Optical SDN Controllers. In2020 Optical Fiber Communications Conference and Exhibition (OFC) 2020 Mar 8 (pp. 1-3). IEEE.

[2] MUST IP SDN Controller SBI Technical Requirements, https://cdn.brandfolder.io/D8DI15S7/as/mfbj6nm7w38xnbvrmcnbp9t6/MUST-IP-Controller-SBI-Requirements-Document-v10_FINAL_VERSION_WEBSITE.pdf

[3] MUST Optical NBI Requirements Document, https://cdn.brandfolder.io/D8DI15S7/as/557f4z3n738v4cww28qjxh6/MUST_Optical_Controller_NBI_Requirements_Document_v10_FINAL_VERSION_WEBSITE.pdf

