

# HORIZON 2020 H2020 - INFRAIA-2020-1

## D6.2 Mid-term Report on Dissemination, outreach, community building and standardisation

Acronym	SLICES-SC
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Reviewers	All partners.



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## Executive summary

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The objective of this document is to present and report on the activities in the field of dissemination, outreach, community building and standardisation in the course of SLICES-SC in respect to the strategy defined in D6.1. The deliverable offers a brief summary of the dissemination strategy of SLICES-SC and provides a mid-term update on the achievements and the progress made by M18. It provides an update on the KPIs, elaborates on the different dissemination channels and the various communication materials used for the promotion of the project. Furthermore, the deliverable also presents past events organised by SLICES-SC and third parties as well as the publications created within the scope of the project. Last, D6.2 also covers efforts made towards standardisation and briefly elaborates on relevant topics, standard developing organisations, partners and timeframes to accomplish the standardisation task.



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## 1. Introduction

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### 1.1. Objective of deliverable

With SLICES-SC reaching the middle of the project duration, D6.2 aims to report on the mid-term progress made regarding the implementation of the SLICES-SC dissemination and communication strategy described in D6.1 - Dissemination, outreach, community building and standardisation Plan. The present deliverable is a direct continuation of D6.1 and addresses the efforts made in terms of communication, dissemination and standardisation. It notably draws upon the project's outreach channels, details past events organised by SLICES-SC and external partners and elaborates on standardisation pushes.

### 1.2. Document structure

The document is divided into the following sections:

- Chapter 1 – Introduction
- Chapter 2 – Dissemination and community building overview
- Chapter 3 – Means and activities
- Chapter 4 – Academic outreach and exploitation
- Chapter 5 – Standardisation
- Chapter 6 – Conclusion



## 2. Dissemination and community building overview

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### 2.1. Introduction

This section elaborates on the chosen dissemination and communication approach, presents the indicators used to measure progress and reports on the mid-term achievements regarding dissemination, outreach, community building and standardisation. As a reminder, the main objectives of the SLICES-SC dissemination and communication strategy are described in D6.1. In summary, the aim is to guarantee a distinctive SLICES-SC brand identity, ensure broad visibility of the project's results both among stakeholders and beyond and facilitate the exploitation of SLICES-SC outcomes for consortium partners.

### 2.2. Dissemination and communication approach

To guarantee the pertinence of the disseminated information and to maximise outreach, the adopted approach consists of involving all project partners. Custom social media templates have been created, which the partners simply have to fill in to guarantee uniform communication. Initially, individual contributions from each consortium member were requested. Due to the inefficacy of this method, the strategy was reoriented towards a node approach to increase the partners' contributions to communication activities both for social media and the SLICES blog. It has been agreed to group partners into country-specific nodes. Each node consists of partners from the same country, with 15 country nodes currently existing. The partners were asked to identify a focal point for their respective node, which is responsible for coordinating communication efforts within the node and ensuring the respect of set deadlines. This approach aims to gather information and news at the national level rather than per partner, increasing the relevance of the contributions.

### 2.3. Key Performance Indicators

The Key Performance Indicators (KPIs) for outreach activities have been defined in the proposal stage and cover various areas, including project documentation, project publications, online presence and events. The following table summarises the communication and dissemination-specific KPIs, as per the Description of Actions.

The KPI table below serves as the main reference to the Work Package Leader, IoTLab, for monitoring and evaluating the communication activities. In addition to the table, regular conference calls were organised at the WP6 level to keep track of the progress and the partners' individual communication activities.

## 2.4. Mid-term status of KPIs

Table 1: Project KPIs

Measure	Target	Status in mid-term
SLICES-SC brochure (1 with updates every year)	At least 200 per year	SLICES has organised a community of approx. 1500 people, which had been regularly informed about the SLICES activities (mainly electronically).
Posters	2 by the end of SLICES-SC	Two posters (roll-up) created and used in physical presence events (Such as IoTWeek 2022, EuCNC 2022, IFIP Networking 2022, and SLICES-SC Summer school) (see below).
Set of high-level materials for policymakers (mission statement, slide deck, brochure)	At least 1 per year	SLICES presentations, <a href="#">SLICES family project leaflet</a> disseminated to SLICES community through the presentations within different events or through SLICES direct mails to the community.
SLICES-SC website	> 1,000 visitors per year	16,337 website visitors, while 12,684 unique page views (On 31 Aug. 2022)
Social networks	> 500 > 100	346 followers (Twitter) 184 Followers (LinkedIn) 51 followers (Slack Channel) (On 22 Sept. 2022)
SLICES Blog	1 per month	4 blog posts
Workshops regarding SLICES-SC design and demand organised	6 by the end of the project with at least 30 participants at each event	3 workshops organised within the reporting period as presented in section 3.10.1.
Summer Schools	2 by the end of the project with at least 30 participants at each event	1 summer school organised in Volos (July 2022) with more than 50 participants.
Industry and Local Info Days	16 by the end of the project including 3 Industry Days one per year with at least 30 participants at each event	6 events: 1 Industry Day organised by COSMOTE (in collaboration with WP5) with more than 50 participants, one organised by IMDEA and four local info days (France, Germany, Spain and Hungary) SLICES National Roadshow. One exhibition organised by UOULU in collaboration with the 6G Flagship Program.
Videos	2 videos and >50 views per video	8 videos on the <a href="#">YouTube Channel</a> , with a total of 547 viewers (on 19 Sept. 2022).
Scientific publications	At least 5 by the end of the project	The project has published 3 journal papers and 5 conference papers, as presented in section 3.9

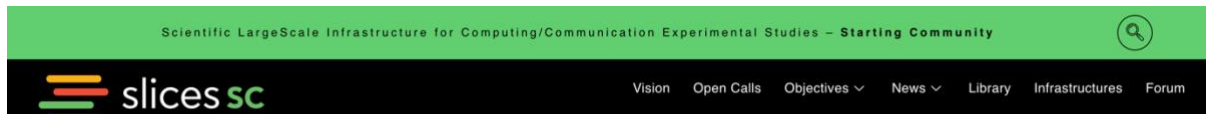


Presentations	At least 3 per year	19 presentations in third-party events as presented in section 3.10.
Attended external events	At least 6 attended external events during the overall project's duration	19 third party events attended as presented in section 3.10.2.

### 3. Dissemination channels and tools reports

#### 3.1. Website

The SLICES-SC website (<http://slices-sc.eu/>) is the primary platform for promoting and disseminating the project's objectives, activities and results to a wide audience. It is used both as a communication and dissemination channel. Indeed, it assists in raising awareness and ensuring maximum visibility of the project's vision, objectives, work plan, documents, infrastructure and dissemination materials, not only within the scientific community but also to a larger public.



#### what is Slices-SC?

Today we are experiencing the digital transformation happening with an unprecedented pace, with the community constantly researching on new solutions to support this transformation with ample computational power and connectivity. Towards addressing such research efforts, Research Infrastructure (RI) specific to addressing Digital Sciences research efforts have been deployed worldwide, towards trying to address key aspects contrary to off-the-shelf commercial infrastructure:

- 1) Full control over the parameters of an experiment,
- 2) Repeatable experiments regardless of the physical infrastructure,
- 3) Valid experimental results, which are easy to cross-reference and replicate.

As such, several RIs have emerged, offering experimentation services with bleeding edge resources, that otherwise are only offered only in industrial R&D laboratories, with limited functionality. Towards combating these issues, SLICES Research Infrastructure is about to be deployed, aiming to provide high quality experimentation services with emerging technologies around the area of digital sciences (5G/6G, NFV, IoT and Cloud Computing), in an Internet scale setup.

*Figure 1: SLICES-SC website – 1*



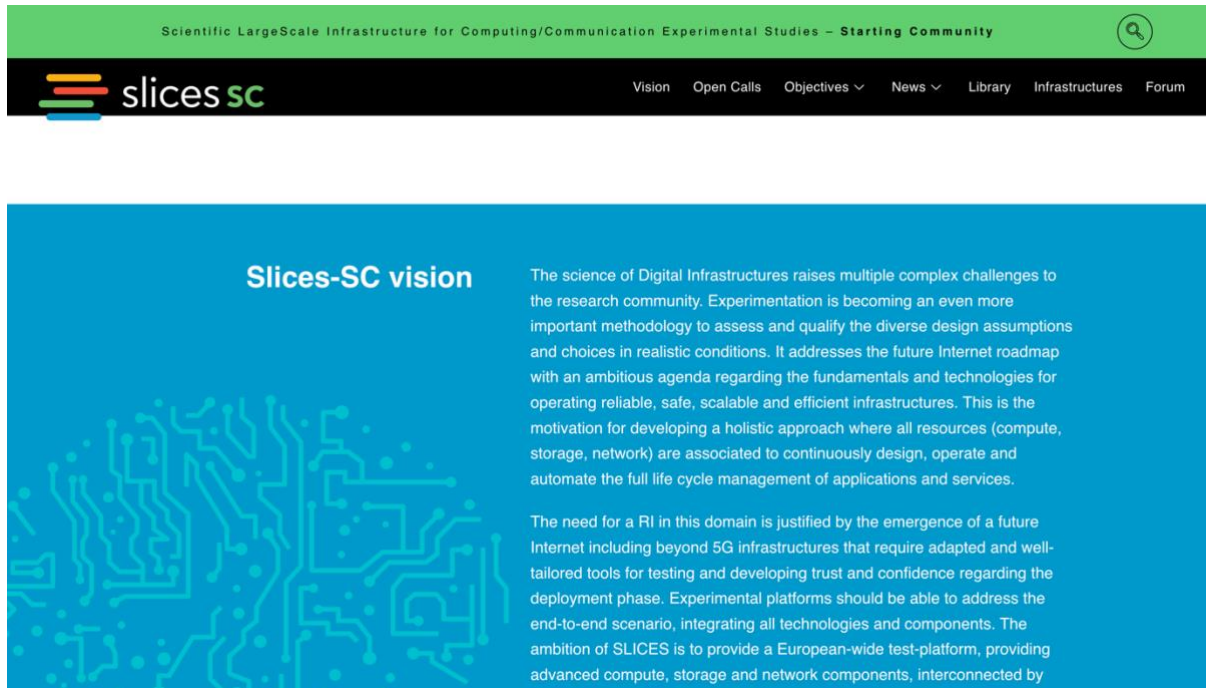


Figure 2: SLICES-SC website – 2

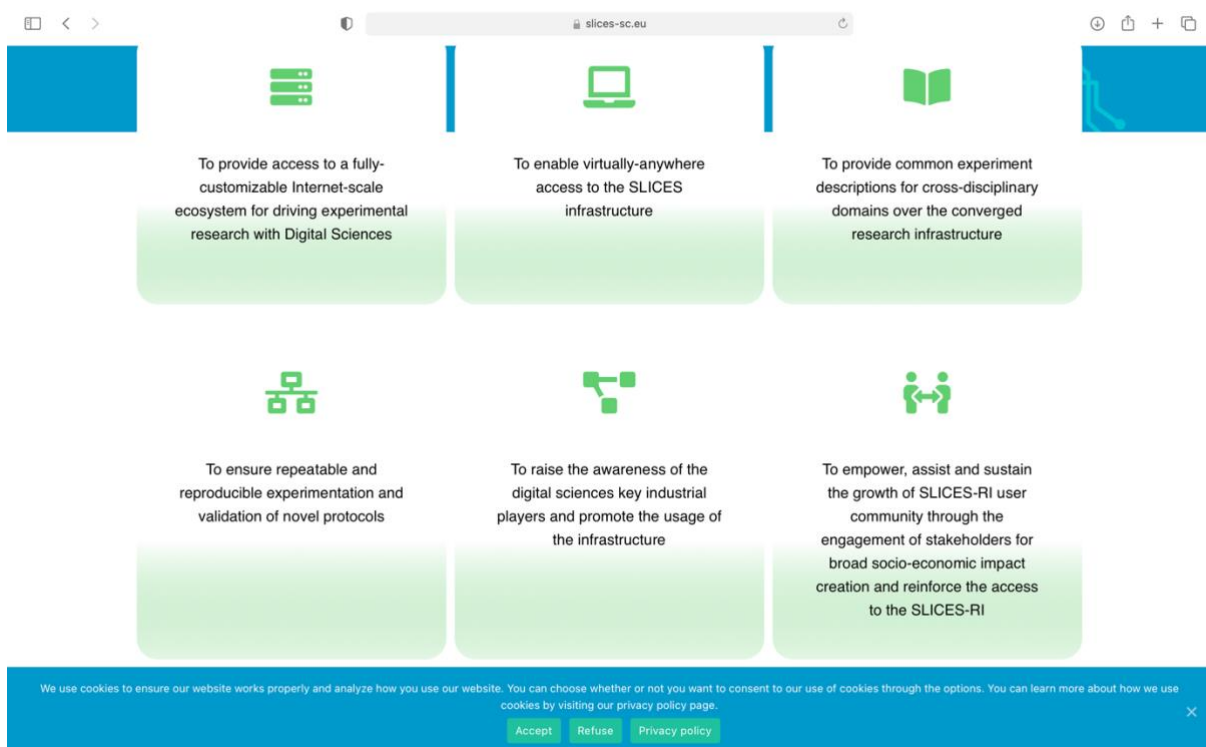


Figure 3: SLICES-SC website – 3

The website's purpose is to serve as the central source of information for SLICES-SC, providing insights into its activities, news, and developments. It targets all stakeholders to raise awareness and foster



engagement. The website is promoted on social media as well as in digital and hard copy promotional materials and publications.

### 3.1.1. Website key numbers and statistics (mid-term)

The statistics on the user behaviour of the SLICES-SC website are depicted in the figures below (covering the period of the first reporting period until August 2022). The website received more than 16,337 page-views over that period. The various peaks in the number of website visits visible in the figures are very likely linked to project events and milestones. For example, the peak in the middle of June 2022 is related to the organisation of the SLICES-SC workshops (EuCNC & 6G Summit, IFIP Networking 2022 conference, IoT week) as depicted clearly in figure 4 covering the period between May and August 2022.

The statistics on the website visitors also show that the project has good visibility within Europe, as well as in the USA and China. This might reflect a growing interest in the topic of research infrastructure in these regions. Furthermore, events in which SLICES-SC participated or was mentioned could also have led to this broad visibility. Such events included the IoT Week which included a track on transatlantic cooperation with the USA, the Networking Channel webinar series organised by Sorbonne University and Digital Around the World, involving participants from all regions of the world including the USA and China.

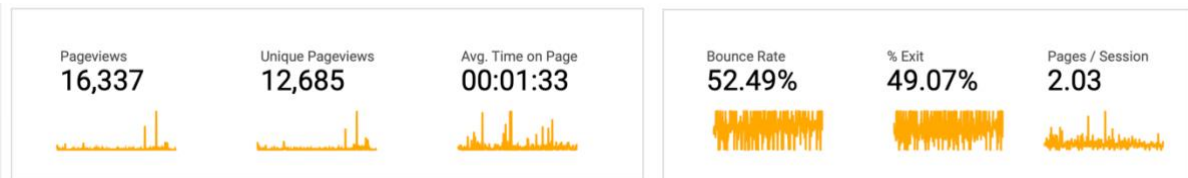


Figure 4: Overview of user behaviours



	Country	Users	New Users
1.	France	650	632
2.	Greece	299	271
3.	United States	735	731
4.	Italy	291	279
5.	Spain	254	251
6.	Netherlands	238	231
7.	Germany	209	209
8.	China	309	308
9.	Finland	154	155
10.	Belgium	96	90
11.	Portugal	65	66
12.	Poland	70	67
13.	Switzerland	81	76
14.	United Kingdom	126	124
15.	Norway	68	66

1 - 20 / 136 < >

Figure 5: Number of visitors per country

### 3.2. Slack and User Forum

As described in task 6.2, SLICES-SC has developed a ‘User Forum’, serving as a collaborative platform for the SLICES community of experts. For this purpose, SLICES-SC has explored a dual approach to community engagement to identify the tool that best fits the needs of the users. First, under task 6.2, a user forum has been developed by IoT Lab, which aims to enable access to centralised information and the various resources and installations elaborated by the SLICES research infrastructure (RI). The portal is currently available in beta version and accessible via registration at <https://slices-forum.eu/>. IoTLab acts both as the host and manager of the forum, with SLICES-SC partners providing support for moderation, as necessary. WordPress serves as the Content Management System (CMS) for the User Forum. The portal has been structured according to several relevant topics, such as “testbed integration”, “research collaboration”, “standardisation”, etc.

Second, the consortium also proposed to create a Slack channel for the SLICES project in order to facilitate community engagement. The Slack channel is directly accessible via the SLICES-RI and SLICES-SC websites under ‘Slices Forum’ and ‘Forum’ respectively. The ‘#general’ channel has been piloted during the Summer School in Volos with more than 50 members joining the channel. The idea is that Slack should serve as the main discussion platform during events, enabling the community to discuss by threads and topics. Members will also be invited to project workshops and events, get early information on project developments, and will be requested to provide annual feedback to SLICES-SC for continuous improvement. The Slack channels will be collectively supported by all members of the consortium. All interested members have the possibility to register and access the channels. Through Slack, the SLICES-SC partners will also provide help and support to the research community for technical questions linked to the SLICES research infrastructure.

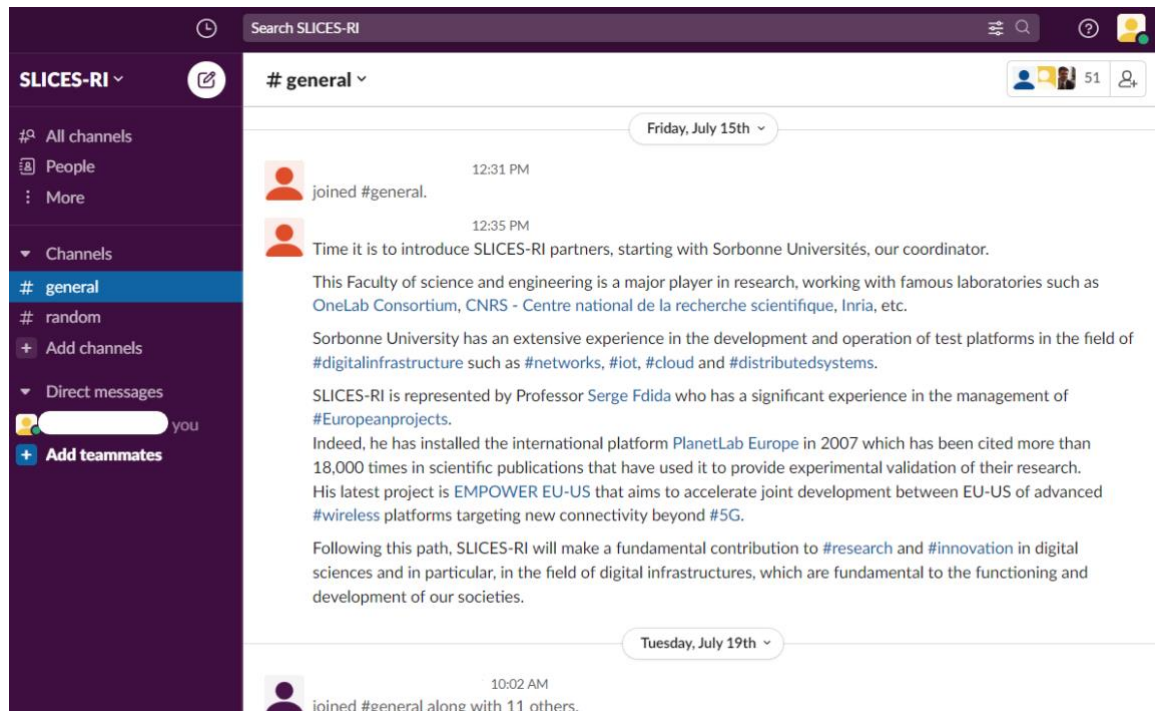


Figure 6: Slack Interface

On the other hand, the User Forum on the website will also be maintained, with the idea to test it in the second part of the project. The User Forum will define and keep up-to-date a map of all the installations available at SLICES-RI infrastructure and facilitate their access. Simultaneously, it will focus on facilitating collaborative interactions within the community of users of SLICES-RI. To this end, the User Forum includes a 'Forum' (discussion) section which allows interactions between the SLICES community members and relevant stakeholders. The threads of the forum will be updated according to the needs of the SLICES community. Currently, the Forum includes the following initial threads:

- Community building;
- Interoperability;
- Sustainable development;
- User & researcher requests;
- Standardisation;
- Research collaboration;
- User interface & utilities;
- Testbed integration.

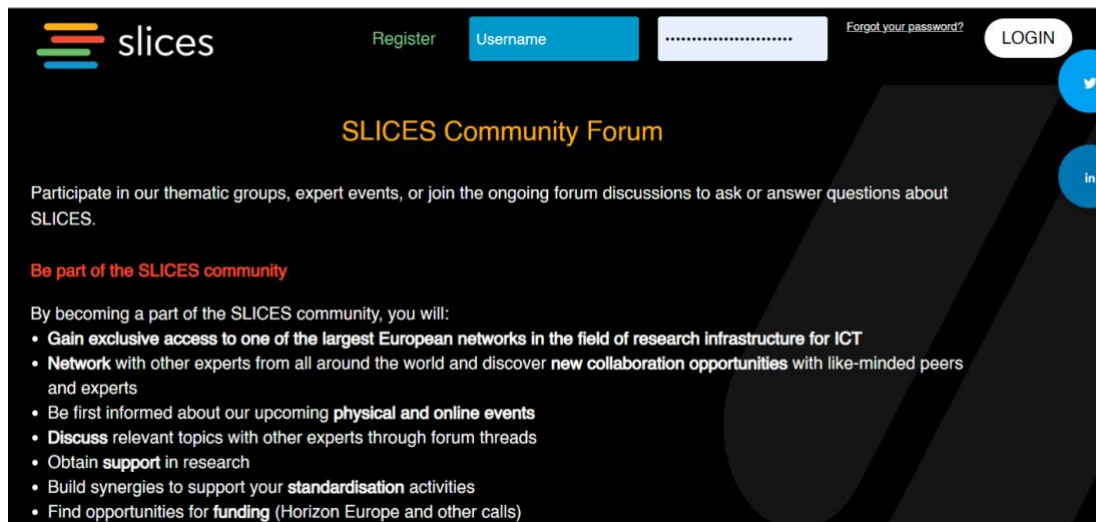


Figure 7: User Forum webpage – 1



Figure 8: User Forum webpage – 2

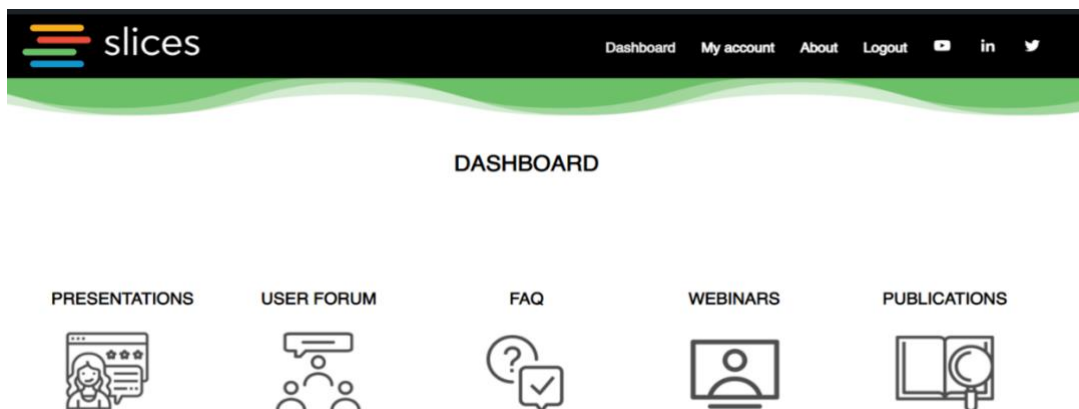


Figure 9: User Forum dashboard



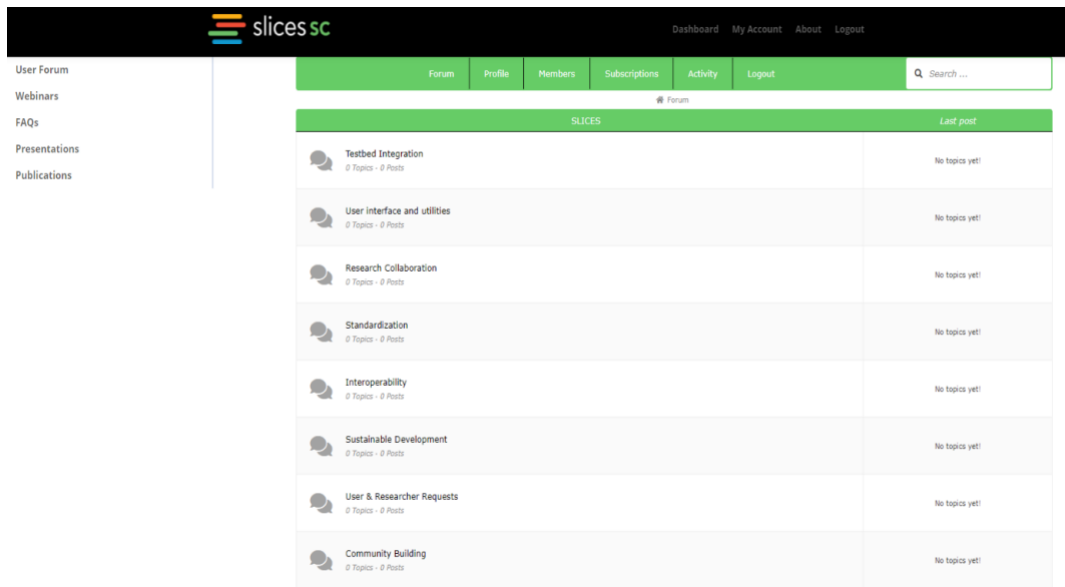


Figure 10: User Forum discussion threads

However, it has to be noted that both platforms dispose of specific advantages and disadvantages, as summarised in the SWOT analysis below. As of now, both options are being explored and the decision on the best option will be made after further exploration.

Table 2: SWOT Analysis - Slack vs User Forum

STRENGTHS		WEAKNESSES	
<b>User Forum</b> <ul style="list-style-type: none"> <li>Secure (Hosted on GDPR compliant European server)</li> <li>Controllable</li> </ul>	<b>Slack</b> <ul style="list-style-type: none"> <li>Dynamic, possibility of threads, private messaging, etc.</li> <li>Collaborative approach, easy to respond to requests and questions</li> <li>Many useful functions</li> </ul>	<b>User Forum</b> <ul style="list-style-type: none"> <li>Lack of dynamic interaction</li> <li>No possibility of directly adding new channels</li> </ul>	<b>Slack</b> <ul style="list-style-type: none"> <li>Server is hosted with Amazon Web Services in the USA which entails possible GDPR breaches</li> <li>Fewer options to moderate the discussion</li> </ul>
OPPORTUNITIES		THREATS	
<b>User Forum</b> <ul style="list-style-type: none"> <li>Development of an exclusive platform that could be more appropriate for the nodal approach</li> </ul>	<b>Slack</b> <ul style="list-style-type: none"> <li>Increased and facilitated coordination between partners</li> </ul>	<b>User Forum</b> <ul style="list-style-type: none"> <li>Potentially lack of active users</li> </ul>	<b>Slack</b> <ul style="list-style-type: none"> <li>Potentially lack of active users</li> </ul>

### 3.3. Promotional material

Small booklets in the form of brochures and flyers have been designed in line with the SLICES-SC visual identity. These promotional materials aim at providing general information on SLICES-SC while also informing about issues addressed and solutions offered. Furthermore, the material can be used to inform target groups about the activities of the project notably during events (meetings, workshops, conferences).

### 3.4. Poster

Posters are commonly used as communication tools during events such as conferences, symposia, workshops, seminars etc. SLICES has prepared a poster in English (local languages used when appropriate or necessary) to raise the interest of stakeholders and relevant audiences during events organised by the project and external events. It offers insights into SLICES-SC with concise textual and graphical information. Two distinctive layouts have been proposed for SLICES-SC, as depicted in the following figures. The posters have notably been used during the Summer School in Volos, Greece (see Project Event #5 below) and other events such as the EuCNC workshop, the IoT Week and the IFIP Networking workshop. They will also be used during future events to promote SLICES-SC.



Figure 11: Different versions of the SLICES-SC poster

### 3.5. Leaflet

Leaflets are a convenient way of communicating objectives, recent developments and findings of the project to different audiences. They are editable and printable by any of the project partners, and therefore, are tailorable both in terms of content and language. Two templates are depicted in Figure above. Furthermore, a leaflet describing the entire SLICES family has been prepared and distributed electronically to the community. In addition, the presentation of the [SLICES project family](#) prepared and disseminated to the community.

### 3.6. Social media

In the planning stages of SLICES-SC, it was decided to build social media presence to represent the consortium members and the results of the project in an integrated way. The main goals are to bring attention to the project website, amplify its content, support communication and impact creation of SLICES-SC and encourage participation in SLICES-SC communities. The following channels are used: Twitter, YouTube and LinkedIn. In order to reach the wider possible audience, it has been decided to use the same account as the one used for SLICES-RI.

**Twitter**<sup>1</sup>: project-related news and relevant articles from other sources supporting Digital Research Infrastructures are tweeted. The target groups are researchers, the general public, scientific and academic personnel, businesses, NGOs technological developers, policymakers, funding authorities, etc.

The two figures on the next page clearly indicate a strong link between the number of social media visitors, community engagement and events SLICES-SC was involved in. Looking at the Twitter statistics in May 2022, 1,400 impressions can be observed. This coincides with the organisation of the 1<sup>st</sup> Industrial Day and the promotion of other upcoming events and workshops. The top tweet of the month was indeed linked to the Industrial Day.

In June 2022, the SLICES-RI Twitter account received more than 4,000 impressions, relating to the organisation of 3 workshops during that period. The tweet promoting Ivan Seskar’s presentation during the SLICES workshop at IoT Week received the most attention.

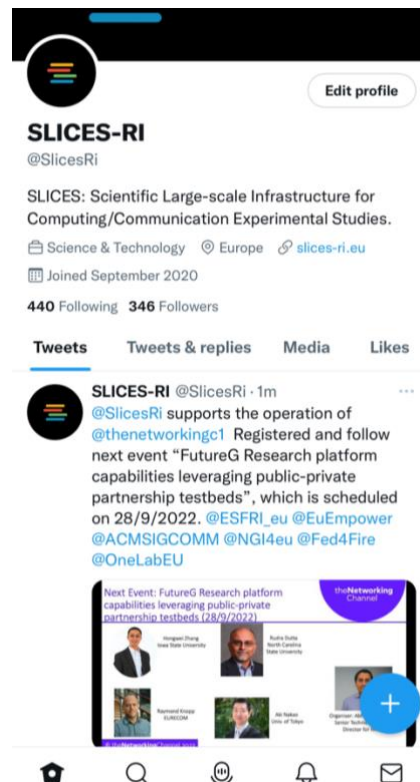


Figure 12: SLICES-RI Twitter profile

<sup>1</sup> Accessible at: <https://twitter.com/SLICESRI> [Last accessed 14 September 2021].





Your Tweets earned **1.4K impressions** over this **31 day** period

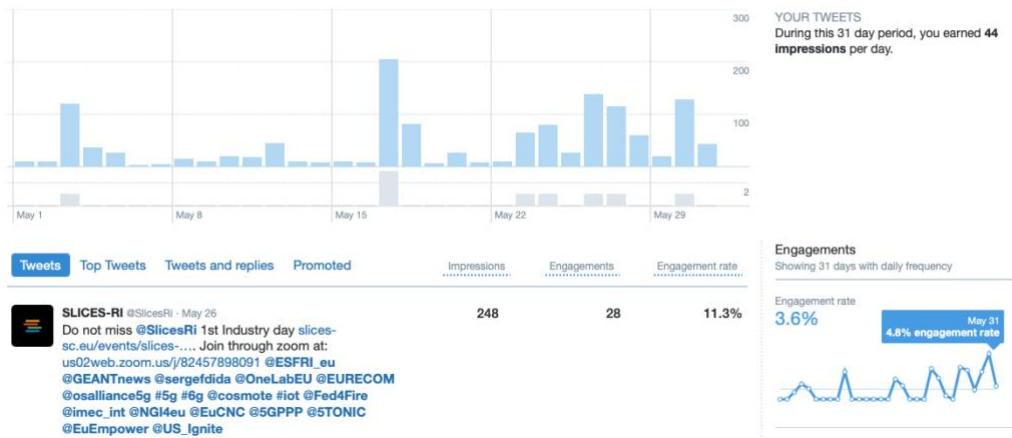


Figure 13: Twitter analytics for May 2022

Your Tweets earned **4.0K impressions** over this **30 day** period

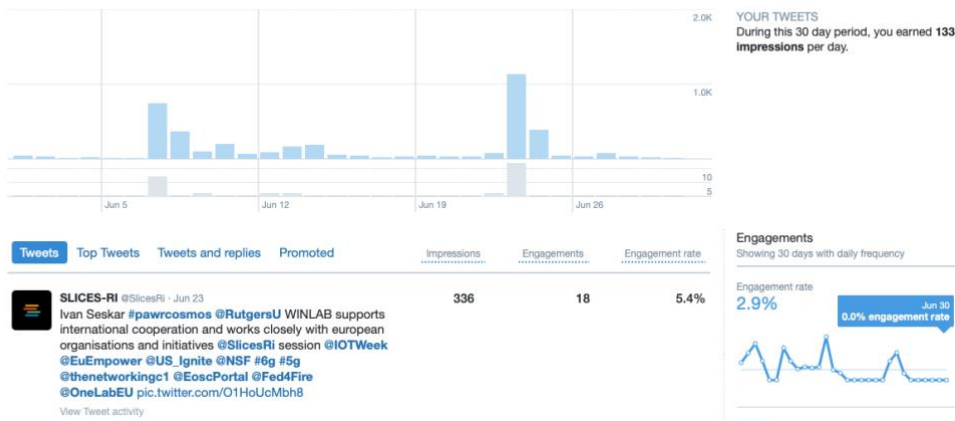


Figure 14: Twitter analytics for June 2022

**YouTube<sup>2</sup>:** promotional videos and “Success Stories” to be linked to the website and Twitter. The frequency depends on the availability of the videos. The target groups are researchers, the general public, scientific and academic personnel, businesses, NGOs technological developers, policymakers, funding authorities, etc. The YouTube channel is used by all the projects of the SLICES family.

<sup>2</sup> Accessible at: <https://www.youtube.com/channel/UCKM15y2D8rRYANUDjLsHug/featured> [Last accessed 14 September 2021].

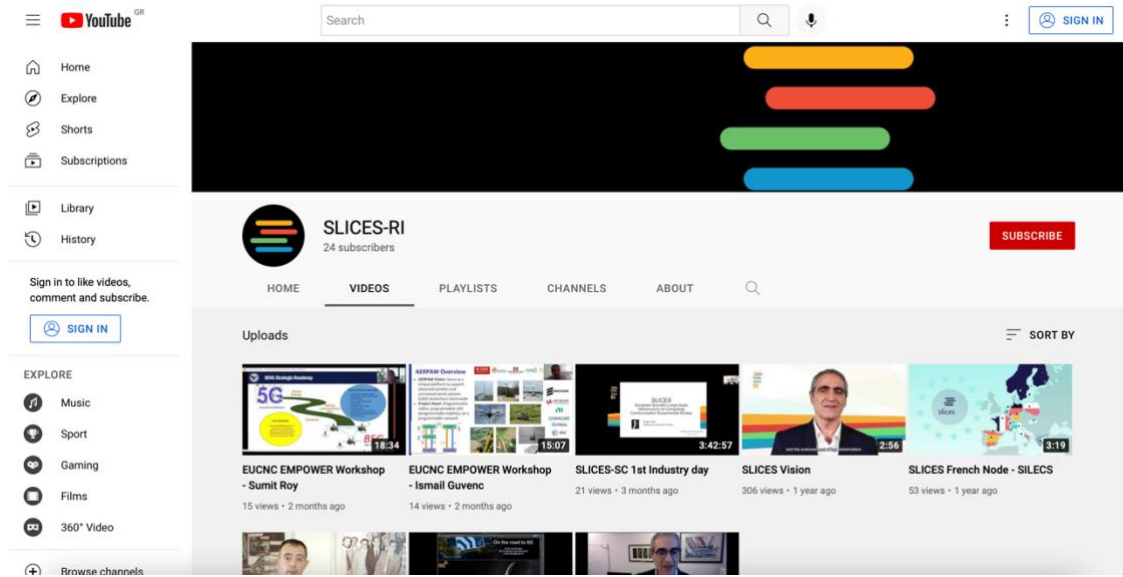


Figure 15: YouTube account

[LinkedIn](#):<sup>3</sup> project-related news and relevant articles from other sources supporting Digital Research Infrastructures are posted. The target groups are researchers, the general public, scientific and academic personnel, businesses, NGOs technological developers, policymakers, funding authorities, etc.

<sup>3</sup> Accessible at <https://www.linkedin.com/company/slices-ri> [Last accessed 14 September 2021].

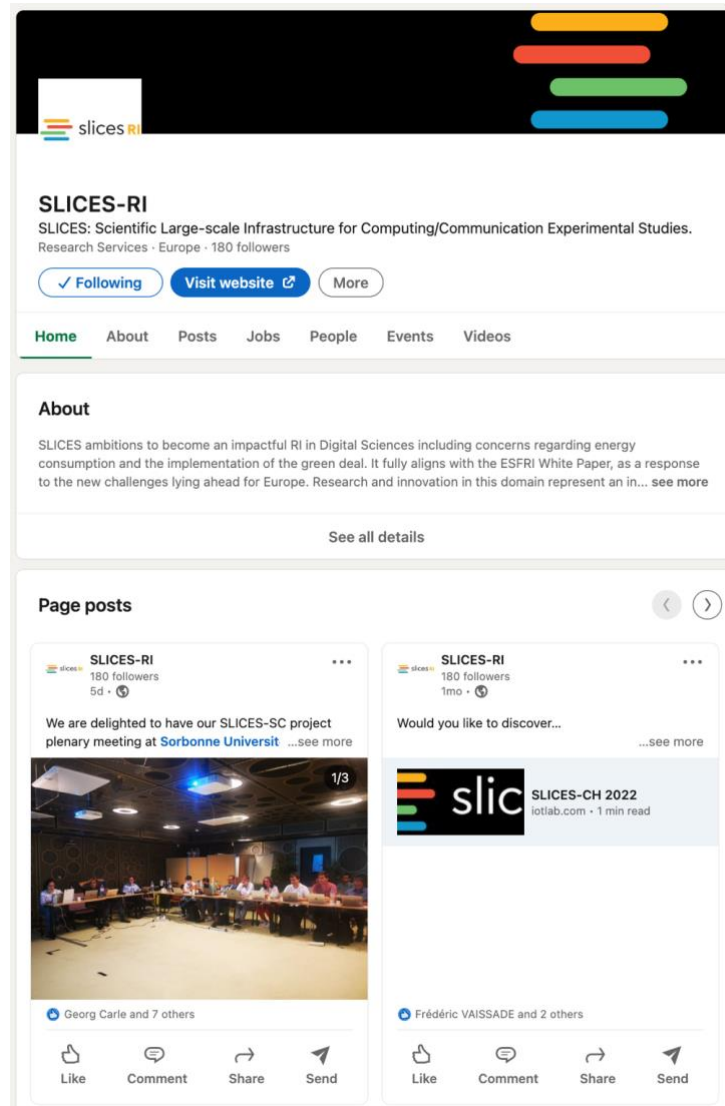


Figure 16: LinkedIn account

### 3.7. SLICES Blog

Scientific blogs are an effective way of communicating scientific research results concisely and understandably. Blog posts can also easily be promoted on different social media channels. Considering the many advantages of blogs, the SLICES Blog has been developed. It is accessible through the SLICES-RI website and currently hosts four posts by partners.

As mentioned, the node approach is used for communication contributions. To guarantee regular inputs, each node has been assigned one blog post per month.



## Slices blog

### MEC Platforms – the state of the art; current developments of the scientific community on the example of the SYMEC project

September 23, 2022

MEC Platforms – the state of the art; current developments of the scientific community on the example of...

### WHAT IS ESFRI

September 23, 2022

WHAT IS ESFRI SLICES-RI (SLICES-RI website) entered the ESFRI Roadmap in 2021, as an ESFRI Project. But what...

### IoT Week 2022

September 23, 2022

IoT Week 2022 SLICES has participated to the IoT Week 2022 held in Dublin, Ireland, from the 20th...

### Oulu 5G Network Adapter

September 23, 2022

Oulu 5G Network Adapter Imagine we have multiple 5G network capable facilities with Network Slicing functionalities. Now their network...

Figure 17: SLICES-SC Blog

### 3.8. TheNetworkingChannel

SLICES community building and awareness will also be expanded through the uptake of the support of the operation of theNetworkingChannel (<https://networkingchannel.eu>). This channel was originally set up by the EU Empower CSA dedicated to the collaboration between EU and US in future advanced wireless platforms, as an answer to the Covid crisis preventing physical meetings. This initiative has been proved a very successful channel that is sustained, with the support of all stakeholders, by having the SLICES community now in charge (as EMPOWER terminated in April 2022). Lessons learnt from its two years of operation, shows that TheNetworkingChannel is working as a fantastic venue for the collaboration between EU and USA. In the last years, characterized by the explosion of virtual events, TheNetworkingChannel has succeed on attracting the networking community thanks to its top-quality talks and speakers. The top watched event has exceeded 1,000 post-event views on the [YouTube channel](#). TheNetworkingChannel continues its operation with new events the SLICES umbrella together with the NSF [PAWR](#) Office, and in cooperation with [ACMSigcomm](#), facilitating the community building, sustaining the international community that counts more than 6000 people and disseminating SLICES' results.

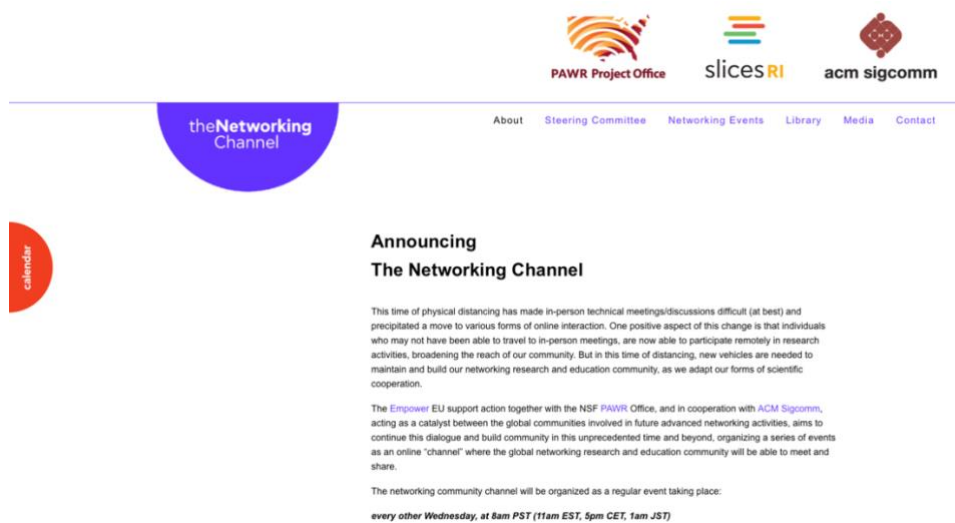


Figure 18: TheNetworkingChannel

TheNetworkingChannel is organized as a regular event, taking place **every other Wednesday, at 8am PST (11am EST, 5pm CET, 1am JST)**, where a diversity of events is organized for the community, live and pre-recorded. Topics are broad and open ranging from research to experimentation and education. The channel consists of webinars, panels, tutorials, virtual site visits, keynotes, and any other innovative forms of community interaction. A dedicated YouTube channel (figure 19) used for the recordings of the events (<https://www.youtube.com/channel/UCAtFAG5JdQrHac6ArIwJ-hw>), is available where previous streams can be downloaded and viewed asynchronously. **There are currently more than 473 subscribers in the YouTube Channel and the recordings of the events have been viewed hundred times. There 7886 replays of the recordings in total; 1100 replays of episode 11; 945 replays of episode 4; 871 replays of episode 1; 593 replays of episode 2.**

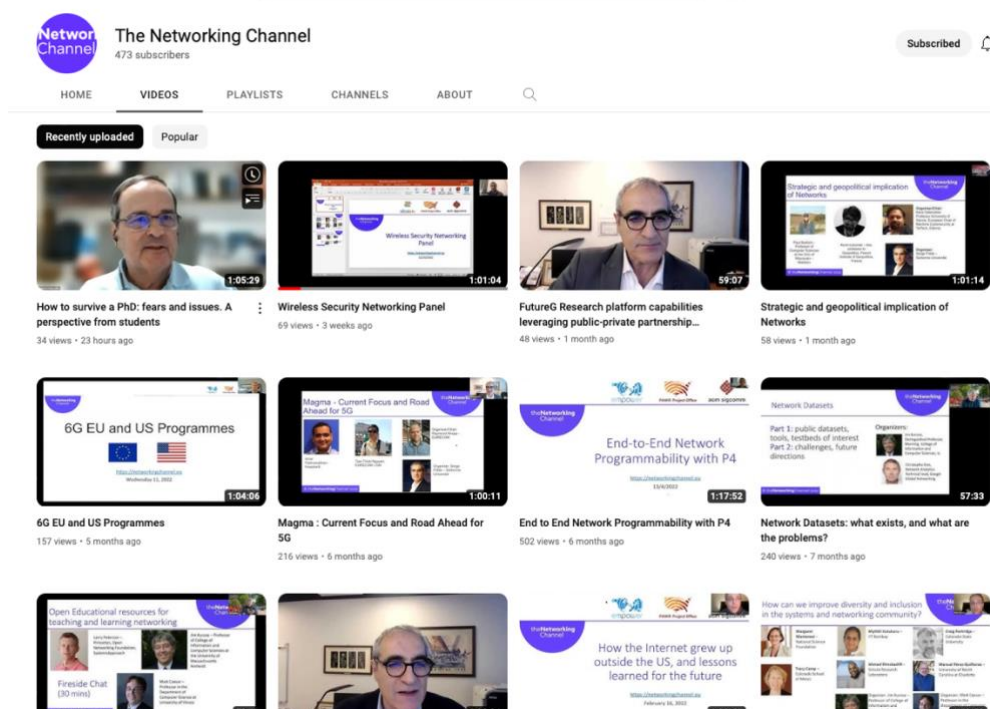


Figure 19: TheNetworkingChannel YouTube Channel



TheNetworkingChannel has organised its dedicated social media, including Twitter account (@thenetworkingc1) with 184 followers and LinkedIn account (<https://www.linkedin.com/company/the-networking-channel/>) with 138 followers.

The uptake of theNetworkingChannel by SLICES will create a great impact to the community and will facilitate the sustainability and exploitation of SLICES activities and results.

### 3.9. Publications of articles

The goal of publishing scientific articles is to foster awareness of the SLICES research infrastructures and its leading-edge technological developments within the most relevant research communities. SLICES-SC dissemination strategy has been defined in Deliverable D6.1, where a list of the most relevant journals and conferences for the publication of ideas and results was defined by taking into consideration reputation and quality as well as offered open access options. A dedicated section of the SLICES-SC website (<https://slices-sc.eu/dissemination/>) will be used to publish references to all consortium publications and to provide access to publications when available. In the case of copyrighted material, the website can provide access to the accepted versions of these papers and not to the published ones, together with a link to the official versions.

As reported in Section 2.4, the expected number of peer-reviewed papers/articles by the end of the project is at least 5, as per the Description of Actions. The project is on track to fulfil this specific dissemination KPI as the number of accepted/published journal papers in the mid-term is 3 (two of them are 100% relevant to SLICES-SC), while the number of accepted/published conference papers in the mid-term is 5. Below are summary tables with the articles that were accepted/published during the reporting period.

Journal #1	
Relevance <sup>4</sup> to SLICES-SC	100%
Title	SLICES, a scientific instrument for the networking community
Authors	Serge Fdida (SU), Nikos Makris (UTH), Thanasis Korakis (UTH) Raffaele Bruno (CNR), Andrea Passarella (CNR), Panayiotis Andreou (UCLAN), Bartosz Beltere (PSNC), Cédric Crettaz (MI), Walid Dabbous (INRIA), Yuri Demchenko (UVA), Raymond Knopp (EURECOM)
Journal/Publisher	Computer Communications, Elsevier Publisher
DOI/Url	<a href="https://doi.org/10.1016/j.comcom.2022.07.019">https://doi.org/10.1016/j.comcom.2022.07.019</a>
Volumes and issues	Volume 193, 1 September 2022, Pages 189-203
Main contribution	This paper reports lessons learned from the design and operation of test platforms for the scientific community dealing with digital infrastructures. Specifically, often experimentally-driven networking research used scattered methodologies, based on ad-hoc, small-sized testbeds, producing hardly repeatable results. On the contrary, computer networks need to adopt a more structured methodology, supported by appropriate instruments, to produce credible

<sup>4</sup> The % of the relevance of a publication has been estimated by the partners and its calculation is mainly based on the resources allocated to the preparation of this publication, in the framework of the SLICES-SC project.





	experimental results supporting radical and incremental innovations. This paper introduces the SLICES initiative as the outcome of several years of evolution of the concept of a networking test platform transformed into a scientific instrument. Furthermore, it addresses the challenges, requirements and opportunities that our community is facing to manage the full research-life cycle necessary to support a scientific methodology
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**Journal #2**

Relevance to SLICES-SC	100%
Title	Passive delay measurement for fidelity monitoring of distributed network emulation
Authors	Houssam El Bouanani (INRIA), Chadi Barakat (INRIA), Walid Dabbous (INRIA), Thierry Turlett (INRIA)
Journal/Publisher	Computer Communications, Elsevier Publisher
DOI/Url	<a href="https://doi.org/10.1016/j.comcom.2022.07.004">https://doi.org/10.1016/j.comcom.2022.07.004</a>
Volumes and issues	In Press, Available online 18 July 2022
Main contribution	Emulation has become a popular approach for the validation and evaluation of network research. However, as the network components are only virtual, emulation lacks the inherent realism of physical testbeds. Monitoring specific metrics of the emulated network is not difficult to implement in a single-machine setting (e.g., with Mininet), while monitoring is limited by the lack of time synchronisation in scenarios where the emulation is distributed over multiple physical machines (e.g., Distrinet). In this paper, we tackle the case of packet delay monitoring, to which we propose a methodology for passively measuring one-way delays with underlying assumptions about time synchronisation, and round-trip delays otherwise. For an efficient implementation of our methodology, we propose an eBPF-based packet measurement tool that performs better than current packet sniffers under emulation-specific assumptions. We implement and evaluate our system in an open testbed and show that it can reach results within a few microseconds of perfect accuracy and precision.

**Journal #3**

Relevance to SLICES-SC	33%
Title	Reliable data delivery in ICN-IoT environments
Authors	Eleonara Borgia (CNR), Raffaele Bruno (CNR), Andrea Passarella (CNR)
Journal/Publisher	Future Generation Computer Systems, Elsevier Publisher
DOI/Url	<a href="https://doi.org/10.1016/j.future.2022.04.004">https://doi.org/10.1016/j.future.2022.04.004</a>
Volumes and issues	Volume 134, September 2022, Pages 271-286

Main contribution	Information-Centric Networking (ICN) paradigm is an appealing model for efficiently retrieving application data in IoT environments. In this paper, we enhance an ICN-based data delivery protocol, called MobCCN, which we designed for operating efficiently in such context, with different retransmission mechanisms. A prototype of the enhanced MobCCN was implemented as an extension of CCN-lite, a lightweight open source CCN implementation supporting various hardware/software platforms, including the OMNeT++ simulator.
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Conference #1	
Relevance to SLICES-SC	90%
Title	The POS framework: a methodology and toolchain for reproducible network experiments
Authors	Sebastian Gallenmüller (TUM), Dominik Scholz (TUM), Henning Stubbe (TUM), Georg Carle (TUM)
Venue	CoNEXT '21: Proceedings of the 17th International Conference on emerging Networking EXperiments and Technologies
DOI/Url	<a href="https://doi.org/10.1145/3485983.3494841">https://doi.org/10.1145/3485983.3494841</a>
Dates and place	December 2021, Munich, Germany (Virtual Conference)
Main contribution	This paper presents a methodology for network experiments that relies on an automated experimental workflow to enable the experiments to be repeatable. The proposed methodology introduces an experimental structure that divides the experiments into setup, experiment, and evaluation phases, in addition to the division between experiment scripts and experiment parameters. A toolchain, called plain orchestrating service (POS), is also developed to enable the creation of such experimental workflow, as well as the automation of the bundling and release of all the created experimental artefacts.

Conference #2	
Relevance to SLICES-SC	90%
Title	Orchestration Software for Resource Constrained Datacenters: an Experimental Evaluation
Authors	Alexandros Valantasis (UTH); Nikos Makris (UTH); Thanasis Korakis (UTH)
Venue	NetSoft'22: IEEE 8th International Conference on Network Softwarization
DOI/Url	<a href="https://doi.org/110.1109/NetSoft54395.2022.9844043">https://doi.org/110.1109/NetSoft54395.2022.9844043</a> .
Dates and place	27 June–1 July 2022, Milan, Italy
Main contribution	Handheld devices, edge/fog resources, and core cloud datacenters comprise a resource continuum that can be used for hosting almost





	any service. This paper evaluates two lightweight frameworks which can be used for orchestrating micro-services on top of far-edge devices that participate in the resource continuum, located at the network access or the fog, and are usually resource-constrained.
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**Conference #3**

Relevance to SLICES-SC	90%
Title	HVNet: Hardware-Assisted Virtual Networking on a Single Physical Host
Authors	Florian Wiedner (TUM), Max Helm (TUM), Sebastian Gallenmüller (TUM), Georg Carle (TUM)
Venue	IEEE INFOCOM 2022 - IEEE Conference on Computer Communications Workshops (INFOCOM WKSHPS)
DOI/Url	<a href="https://doi.org/10.1109/INFOCOMWKSHPS54753.2022.9798351">https://doi.org/10.1109/INFOCOMWKSHPS54753.2022.9798351</a>
Dates and place	2-5 May 2022, Virtual Conference
Main contribution	In this paper we propose HVNet, a novel approach to create virtualised topologies on a single host utilizing real networking hardware. Relying on real hardware, our approach offers realistic network behaviour and high-precision measurements. We observed repeatable results with a small error margin and a low impact of the measurement setup on experimental results.

**Conference #4**

Relevance to SLICES-SC	100%
Title	Prototyping Facilities: Developing and Bootstrapping Testbeds
Authors	Sebastian Gallenmüller (TUM), Eric Hauser (TUM), Georg Carle (TUM)
Venue	IFIP Networking Conference, 2022
DOI/Url	<a href="https://doi.org/10.23919/IFIPNetworking55013.2022.9829817">https://doi.org/10.23919/IFIPNetworking55013.2022.9829817</a>
Dates and place	June 13-16 2022, Catania, Italy
Main contribution	In this paper, we apply a prototype-driven approach to the development of the testbeds themselves. Thus, we select abstractions and APIs to modularise testbeds to allow a selective adaptation or substitution of specific components. To minimise costs, our approach aims to consolidate all components into a single system. We try to keep the behaviour and the performance as close to a hardware-based testbed by relying heavily on hardware acceleration of IO.

**Conference #5**

Relevance to SLICES-SC	100%
Title	Reproducible by Design: Network Experiments with pos



Authors	Sebastian Gallenmuller (TUM), Dominik Scholz (TUM), Henning Stubbe (TUM), Eric Hauser (TUM), Georg Carle (TUM)
Venue	WueWoWAS 22: Würzburg Workshop on Next-Generation Communication Networks
DOI/Url	<a href="https://opus.bibliothek.uni-wuerzburg.de/opus4-wuerzburg/frontdoor/deliver/index/docId/28083/file/Gallenmueller_et_al_Reproducible_Design_WueWoWas22_1570805750.pdf">https://opus.bibliothek.uni-wuerzburg.de/opus4-wuerzburg/frontdoor/deliver/index/docId/28083/file/Gallenmueller_et_al_Reproducible_Design_WueWoWas22_1570805750.pdf</a>
Dates and place	July 11-13 2022, Würzburg, Germany
Main contribution	In this paper, we further extend the POS framework by providing an interactive environment where pos experiments can be executed and reproduced. Tools are available at <a href="https://gallenmu.github.io/single-server-experiment">https://gallenmu.github.io/single-server-experiment</a>

### 3.10. Events

In the context of SLICES-SC Networking activities, SLICES members are participating in two types of events to disseminate the project results to a broader audience: dedicated *project events* organised by the project members and *third-party events* organised by the community (EC and other venues).

The goal is to increase the visibility and the impact of the integration of starting communities in the SLICES-RI while attracting more users. Here follows a description of dissemination activities of the two types realised by the project members during the reporting period.

#### 3.10.1. Project events

Project Event #1	
Title	SLICES 5GTONIC Node meeting with Industry and Government
Organizer(s)	IMDEA/UC3M
Partners involved	IMDEA, UC3M, Industry (Telefonica, ASTI and Ericsson), The Secretary General for Innovation of the Ministry of Science and Innovation and the Director General for Research of the Regional Government of Madrid
Date	March 16, 2022
Location	IMDEA Networks, Leganés, Madrid
Category	Industry Day ( <i>in collaboration with WP5</i> )
Type of audience	Industry, Government, Policy Makers
Size of audience	20
Countries addressed	Spain
URL	<a href="https://networks.imdea.org/the-secretary-general-for-innovation-of-the-ministry-of-science-and-innovation-and-the-director-general-for-research-of-the-regional-government-of-madrid-visit-imdea-networks/">https://networks.imdea.org/the-secretary-general-for-innovation-of-the-ministry-of-science-and-innovation-and-the-director-general-for-research-of-the-regional-government-of-madrid-visit-imdea-networks/</a>
Description	The Secretary General for Innovation of the Ministry of Science and Innovation and the Director General for Research of the Regional Government of Madrid visit IMDEA Networks and 5TONIC research facility



to learn about the cutting-edge projects that the Institute is currently developing to improve the future of communications networks. SLICES was presented to the audience as the first ESFRI infrastructure in Europe for ICT research and experimentation that will play a relevant role in bringing Europe to the forefront of digitalization. The Industry was represented in that meeting with Telefonica, ASTI and Ericsson. The main outcome of that meeting has been the identification of the need for national funding support to SLICES from both national and regional government



Project Event #2	
Title	The 3rd KuVS Fachgespräch Network Softwarization
Organiser(s)	Uni Tuebingen and Technical University of Munich
Partners involved	Technical University of Munich
Date	April 7/8, 2022
Location	Online
Category	Workshop Local Info day and expert discussion
Category	<a href="https://kn.inf.uni-tuebingen.de/kuvs-fg-netsoft/2022">https://kn.inf.uni-tuebingen.de/kuvs-fg-netsoft/2022</a>
Type of audience	Researchers from academia and Industry
Size of audience	105
Countries addressed	Germany
URL	<a href="https://www.kuvs.de/newsletter/kuvs-newsletter_2022-06.pdf">https://www.kuvs.de/newsletter/kuvs-newsletter_2022-06.pdf</a> (p. 26)
Description	The 3rd KuVS Fachgespräch Network Softwarization was organized on April 7/8, 2022, by Michael Menth (Uni Tuebingen) and Georg Carle



	(Technical University of Munich) via Zoom. In the session in which the SLICES activities were presented, we emphasized the reproducibility of experimental results. We discussed the need for an appropriate testbed and experiment design with the German community. The workshop attracted 105 registered persons, most sessions were attended by 50-60 participants. The presentations led to many intense discussions that continued during the breaks.
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**Project Event #3**

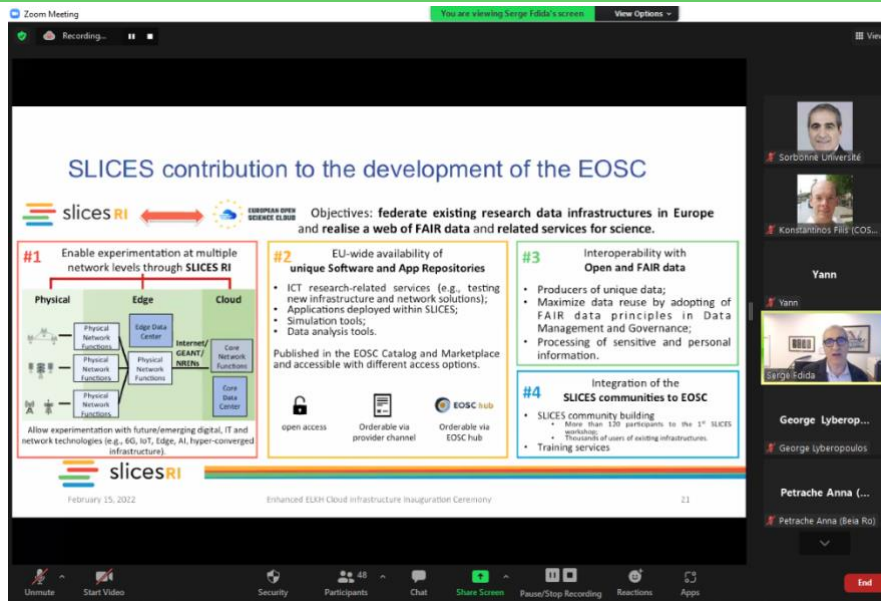
Title	SLICES France Roadshow event
Organiser(s)	SU, INRIA, EURECOM
Partners involved	Partners of SLICES-FR; relevant French stakeholders (mainly academics), French Ministry (MESRI)
Date	June 28, 2022
Location	Paris (INRIA premises)
Category	Workshop Local Info day and expert discussion
Type of audience	Researchers from academia
Size of audience	40
Countries addressed	France
URL	N/A
Description	Discussion on how to structure and implement the French node.

**Project Event #4**

Title	First SLICES Industry Day
Organiser(s)	COSMOTE
Partners involved	SU, INRIA, COSMOTE, MI, EURECOM, UTH, SZTAKI, TUM, PSNC, IMEC, UC3M, IoT Lab,
Date	May 27, 2022
Location	Online
Category	Industry Day ( <i>in collaboration with WP5</i> )
Type of audience	Industry
Size of audience	100
Countries addressed	EU
URL	<a href="https://slices-sc.eu/events/slices-sc-1st-industry-day/">https://slices-sc.eu/events/slices-sc-1st-industry-day/</a>
Description	COSMOTE organised the 1 <sup>st</sup> SLICES-SC Industry Day on May 27, 2022, which was an online free-of-charge event. The purpose of this event was to promote and advertise the SLICES research infrastructure to industry users and consisted of partner presentations (around 15' each) that described the capabilities of their testbeds and what they can offer in particular to industrial users. The event was very broadly advertised



through our industrial and academic connections, together with 6G-IA and 5GPPP. A special site for the event was also created by UTH (<https://slices-sc.eu/events/slices-sc-1st-industry-day/>) There were a total of 15 presentations with 12 presentations having to do with the description of SLICES testbeds and their benefits to the industrial users. The event was quite successful with more than 50 participants attending it.



Project Event #5	
Title	EuCNC & 6G workshop: Empowering Transatlantic Platforms for 5G Advanced and 6G Networks.
Organiser(s)	SU & UTH ( <i>in collaboration with the SLICES-DS project</i> )
Partners involved	SU, UTH, EURECOM
Date	June 7, 2022
Location	Grenoble, France
Category	Workshop, organised in collaboration with the EMPOWER project.
Type of audience	Industry and academia
Size of audience	1,300
Countries addressed	EU
URL	<a href="https://www.eucnc.eu">https://www.eucnc.eu</a> <a href="https://www.advancedwireless.eu/calendar/upcomingevents/#event=71609638;instance=20220607140000?popup=1">https://www.advancedwireless.eu/calendar/upcomingevents/#event=71609638;instance=20220607140000?popup=1</a>
Description	The main objective was to put in contact key persons in Europe and the USA to further develop collaborations and discuss possible joint activities and evolution of the wireless platforms on both sides of the Atlantic towards beyond 5G technologies. In addition, the ongoing work of the EC H2020 5G Infrastructure PPP projects, their NSF PAWR counterparts and



the plans for the EC Horizon Europe Smart Network and Services (SNS) – Joint Undertaking (JU) programme were presented.

The screenshot shows the SLICES RI website interface. At the top is a navigation menu with links for 'Our Mission', 'Community', 'Offering', 'Projects', 'Our News', 'Slices Forum', and 'Contact'. The main content area features the event title 'Empowering Transatlantic Platforms for 5G Advanced and 6G Networks'. Below the title, it lists the location as 'Grenoble' and the date as '7/6/2022'. A 'Read More' button is prominently displayed. To the right, there is a sidebar with event details: 'DATE: Jun 07 2022 (Expired)', 'TIME: All Day', and 'MORE INFO: Read More'. At the bottom of the sidebar is a 'SHARE THIS EVENT' section.

Project Event #6	
Title	IFIP Networking Conference 2022 workshop
Organiser(s)	SU & UTH ( <i>in collaboration with SLICES-DS project</i> )
Partners involved	SU, UTH, EURECOM, CNR, UvA, PSNC, OULU, COSMOTE, UC3M, MI, TUM.
Date	June 13, 2022
Location	Catania, Italy
Category	Workshop
Type of audience	Academia
Size of audience	100
Countries addressed	International (EU & USA)
URL	<a href="https://networking.ifip.org/2022/index.php/slices-workshop/program-slices-worskhop.html">https://networking.ifip.org/2022/index.php/slices-workshop/program-slices-worskhop.html</a> <a href="https://slices-ri.eu/events/slices-workshop-scientific-instruments-to-support-digital-infrastructure-science/">https://slices-ri.eu/events/slices-workshop-scientific-instruments-to-support-digital-infrastructure-science/</a>
Description	<p>Following the call for papers on four main topics (Advanced wireless networking experimentation; Testing Smart/intelligent infrastructure operation and management; Design and validation of new Edge/Fog infrastructures; Methodology for designing and operating a scientific instrument), the purpose of this workshop was to bring together experts in the field of scientific instruments, mainly in advanced wireless, to exchange on testbeds design and components through a series of concrete examples. Organised in collaboration with the PAWR Office, this SLICES event aimed to continue the work started in the INFOCOM 2019 “Workshop on Experimentation Meets Platforms: A Survey of macro trends in mobile communication research and its impact on future testbed development”.</p>





The screenshot shows the SLICES website header with the logo and navigation menu. The main content area features the event title, date (13 June 2022), and a detailed description. A sidebar on the right provides event details: DATE (Jun 13 2022, Expired), TIME (9:00 am - 1:00 pm), and MORE INFO (Read More). A 'Read More' button is also present at the bottom of the sidebar.

Project Event #7	
Title	3 Sessions in IoT Week 2022
Organiser(s)	IoT Lab, SU, MI ( <i>in collaboration with SLICES-DS project</i> )
Partners involved	SU, UvA, INRIA, CNR, COSMOTE, MI, EURECOM, UTH, PSNC, IoT Lab
Date	Jun 23, 2022
Location	Dublin
Dissemination title	International Cooperation for Large Scale Research Infrastructures
Type of audience	Industry, Academia
Dissemination URL	<a href="https://sites.grenadine.co/sites/iot/en/iotweek-2022/schedule/7784/">https://sites.grenadine.co/sites/iot/en/iotweek-2022/schedule/7784/</a> <a href="https://iotweek.org/">https://iotweek.org/</a>
Size of audience	700 registered participants
Countries addressed	EU and worldwide
Description	<p>SLICES had the opportunity to organise a full-day event during IoT Week 2022. It consisted of the following 3 sessions organised and chaired by the SLICES partners</p> <ul style="list-style-type: none"> <li>• <u>Session 1</u>: Data Spaces for Interoperable Research Data Management and Governance (DS4RDM) / Chair: Yuri Demchenko (UW)</li> <li>• <u>Session 2</u>: Research Infrastructure for Cloud, Edge, IoT / Chair: Andrea Passarella (CNR)</li> <li>• <u>Session 3</u>: International Cooperation for Large Scale Research Infrastructures / Chair: Serge Fdida (SU)</li> </ul>



IoT Week 2022 Dublin

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## Data Spaces for Interoperable Research Data Management and Governance

**Themes:** [Research Infrastructure IoT use perspectives & breakthroughs for Europe](#) | [Next Generation ICT Research and Cross-Atlantic Cooperation](#)

**What:** Talk

**When:** 9:00 AM, Thursday 23 Jun 2022 (1 hour 30 minutes)

**Breaks:** ☕ Morning Break at Mezzanine Foyer and Hogan Foyer (Lever 4 and 5) ⌚ 10:30 AM to 11:00 AM (30 minutes)

**Where:** Croke Park Conference Centre - Hogan Mezzanine 2

**How:** You must be logged in to see the requirements for this session.

[Log In](#)


**Discussion:** ● 0


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Inform IoT and research community on the recent developments in Data Spaces widely defined as ecosystem for secure and sovereign data sharing that ensure interoperability at four layers: technical/infrastructure, semantic/metadata, organizational, and legal. Discuss benefits of Data Spaces concept and infrastructure for Research Data Management and Governance.


Bring together and discuss form of cooperation between research data community and current Data Spaces community to develop the future-proof Data Spaces concept and Reference Architecture that would facilitate data exchange between research experimental facilities and industry.

Discuss possible research areas and experimentation/testbed facilities in SLICES-RI to help scientific community implement and benefit from Data Spaces infrastructure and interoperability model, including interoperability with EOSC, IDGA, Gaa-X.

  
**Mark Dietrich**  
Speaker  
 ECR

  
**Silvia Castellvi**  
Speaker  
 IDGA  
 Senior Consultant

  
**Luiz Bonino da Silva Santos**  
Speaker  
 IDGA  
 I3-EMCS

  
**Yuri Demchenko**  
Speaker  
 University of Amsterdam  
 Senior Researcher at the Complex Cyber Infrastructure Research Group

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## Research Infrastructure for Cloud, Edge, IoT

**Themes:** [Research Infrastructure IoT use perspectives & breakthroughs for Europe](#) | [Next Generation ICT Research and Cross-Atlantic Cooperation](#)

**What:** Panel

**When:** 11:00 AM, Thursday 23 Jun 2022 (1 hour 30 minutes)

**Breaks:** ☕ Lunch Break at Mezzanine Foyer and Hogan Foyer (Lever 4 and 5) ⌚ 12:30 PM to 01:45 PM (1 hour 15 minutes)


**Where:** Croke Park Conference Centre - Hogan Mezzanine 2


**How:** You must be logged in to see the requirements for this session.


[Log In](#)


**Discussion:** ● 0


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**Andrea Passarella**  
Moderator  
 CNR


  
**Konstantinos Fili**  
Speaker  
 COSMOTÉ Mobile Communications S.A.  
 Senior Researcher

  
**Bartosz Belter**  
Speaker  
 Poznan Supercomputing and Networking Center  
 Head of Network R&D

  
**Thanasis Korakis**  
Speaker  
 University of Thessaly  
 Professor, Dept. of Electrical and Computer Engineering

  
**Cédric Crettaz**  
Speaker  
 Mandat International  
 Lead Researcher in ICT

  
**Raymond Knopp**  
Speaker  
 EURECOM

  
**Enrico Buracchini**  
Speaker  
 TIM  
 Senior 5G PROJECT MANAGER

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## International Cooperation for Large Scale Research Infrastructures

**Themes:** [Research Infrastructure IoT use perspectives & breakthroughs for Europe](#) | [Cross-Atlantic Research Perspectives](#) | [Next Generation ICT Research and Cross-Atlantic Cooperation](#)

**What:** Talk

**When:** 3:15 PM, Thursday 23 Jun 2022 (1 hour 15 minutes)


**Where:** Croke Park Conference Centre - Hogan Mezzanine 1


**How:** You must be logged in to see the requirements for this session.


[Log In](#)


**Discussion:** ● 0


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**Glenn Ricart**  
Speaker  
 US Ignite and U Utah  
 Founder and CTO

  
**Serge Fidra**  
Speaker  
 Sorbonne University  
 Professor

  
**Olga Cavalli**  
Speaker  
 ARGENSIG - SIG - Dominio Latinoamérica  
 Undersecretary of IT at InnovacionAR - Co-founder - Academic Director - ARGENSIG - SIG - Dominio Latinoamérica

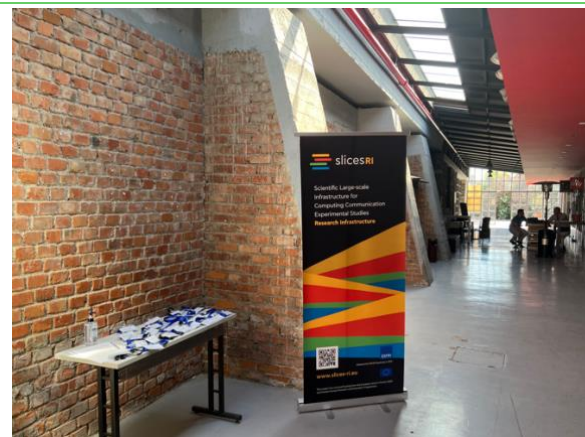
  
**Jerome Subieski**  
Speaker  
 George Mason University  
 Researcher and CO-PI BRIDGES Project

  
**Ivan Seskar**  
Speaker  
 Rutgers University WINLAB  
 Chief Technologist and Director, IT





Project Event #8	
Title	Open-RAN/Core/Edge Solutions for Cloud-Native Telco Experimental Platforms
Organiser(s)	University of Thessaly
Partners involved	UTH, SU, INRIA, UvA, EURECOM, CNR, MI, TUM, COSMOTE,
Date	July 19 – 21, 2022
Location	Volos, Greece
Category	Summer School
Type of audience	Academia
Size of audience	50
Countries addressed	International (EU &USA)
URL	<a href="https://slices-ri.eu/events/slices-sc-summer-school/">https://slices-ri.eu/events/slices-sc-summer-school/</a>
Description	<p>The 1st SLICES-SC Summer School was organised with great success in Volos, titled: Open-RAN/Core/Edge Solutions for Cloud-Native Telco Experimental Platforms. This three-day school took a deep dive into some of the available open software and hardware solutions for building experimental telco networks that can be used by researchers to develop innovations leading to 6G network architectures in initiatives such as SLICES-RI, PAWR, Fabric and Horizon Europe SNS JU. A key objective of the school was to highlight cloud-native tools leading to fully converged cloud and telecommunication infrastructures. The event covered initiatives including O-RAN, ONF Aether/SD-Fabric/SD-RAN, OpenAirInterface RAN and Core, Mosaic5G, Magma and related cloud-native frameworks based on Kubernetes. In addition, for newcomers to the 3GPP ecosystem, SLICES-SC provided a crash course on 3GPP networks and protocols. More than 70 people participated physically and much more online. The agenda and the presentations can be found at the website (see above).</p>





Project Event # 9	
Title	EuCNC & 6G Summit, Exhibition via virtual platform
Organiser(s)	UOULU & INESC TEC
Partners involved	UOULU
Date	June 8 -11.6.2021
Location	Online, Porto Portugal
Category	Exhibition, organised in collaboration with the 6G Flagship Program.
Type of audience	Industry and academia
Size of audience	~1 300
Countries addressed	EU and worldwide
URL	<a href="https://www.eucnc.eu">https://www.eucnc.eu</a> , <a href="https://www.eucnc.eu/2021/www.eucnc.eu/">https://www.eucnc.eu/2021/www.eucnc.eu/</a>
Description	Explore technologies and connected devices which are not yet commercially available discover new potential application areas in ICT but also in vertical sectors including industry, energy, health, transport and logistics. 5G Test Network

SLICES-SC will continue disseminating activities in future potential dedicated project events:

- Networking & Engagement Workshops for research, academia and interested user communities and the industry. These workshops will be organised at the project level and will be held in selected nodes in 6 different countries. It is expected to have strong participation in these events from the project partners as well as from outside. Proposed nodes to organise these events are:
  - France (SU/INRIA), Greece (UTH), Poland (PSNC), Spain (IMDEA), Italy (CNR), Hungary (SZTAKI) and Switzerland (MI).
- Local engagement events organised by the project partners and targeting their local ecosystem. It is expected, therefore, that **each of the 14 project partners will arrange a local event during the project timeframe**. These events are scheduled to be organised between M13 and M30.
- Webinars based on the results of joint research activities realised by SLICES-SC and aiming to present their results to a wider audience. It is expected to organise **one or two webinars for each of the Joint Research Activities work packages (WP2 and WP3)**. Tentative dates are M18 and M20.
- **2 summer schools** to be held in a public space with entertainment, demos, experts' presentations, private and public investors, one in M13-M24 and the second in M25-M36. The first summer school took place in Volos in July 2022. Considered themes for the next summer



school include: IoT to Cloud, Open Data and Reproducibility, Connected Industry, and Time Sensitive Networks.

- **3 hackathons** on selected themes of Digital Sciences. Tentative dates M18 and M24. Potential topics include: 5G innovative services, IoT Security and MEC Performance.

### 3.10.2. Third-party events

Concerning the **third parties' events**, the main targeted venues bringing the community together include:

Third-party Event #1	
Event Name	IoT week conference 2021
Partners involved	MI
Organiser(s)	IoT Lab
Date	September 2, 2021
Location	Online
Event Category	Conference
Event URL	<a href="https://iotweek.org/program-2021/">https://iotweek.org/program-2021/</a>
Dissemination type	Session at IoT week conference 2021
Dissemination title	IPv6-based 5G: IoT, Cloud Computing Industry Session II
Dissemination URL	<a href="https://sites.grenadine.co/sites/iot/en/iot-week-online-edition/schedule/8047/">https://sites.grenadine.co/sites/iot/en/iot-week-online-edition/schedule/8047/</a>
Type of audience	Academia and governmental agencies
Size of audience	40
Countries addressed	EU and worldwide

Third-party Event #2	
Event Name	IEEE 5G World Forum (WF-5G)
Partners involved	MI
Organiser(s)	IEEE
Date	October 13, 2021
Location	Online
Event Category	Conference
Event URL	<a href="https://attend.ieee.org/wf-5g/">https://attend.ieee.org/wf-5g/</a>
Dissemination type	Session at the IEEE 5G World Forum conference
Dissemination title	Leveraging existing testbed infrastructure know-how leading to SLICES
Dissemination URL	<a href="https://attend.ieee.org/wf-5g/8951-2/">https://attend.ieee.org/wf-5g/8951-2/</a>
Type of audience	Academia and governmental agencies



Size of audience	Not communicated by the organiser
Countries addressed	EU and worldwide

**Third-party Event #3**

Event Name	Digital around the World conference 2021
Partners involved	IoT Lab, MI, IMEC
Organiser(s)	IoT Lab
Date	October 20, 2021
Location	Online
Event Category	Conference
Event URL	<a href="https://digitalaroundtheworld.org/">https://digitalaroundtheworld.org/</a>
Dissemination type	Two sessions at the Digital around the World conference 2021
Dissemination title	A first session on International Collaboration For Research Infrastructure and second one on Fundamental research in the EU and the US on new concepts for distributed computing and swarm intelligence.
Dissemination URL	<a href="https://digitalaroundtheworld.org/sessions-2021/">https://digitalaroundtheworld.org/sessions-2021/</a>
Type of audience	Industry, Academia
Size of audience	600
Countries addressed	EU and worldwide

**Third-party Event #4**

Event Name	IEEE 5G World Forum (WF-5G)
Partners involved	MI
Organiser(s)	IEEE
Date	October 13, 2021
Location	Online
Event Category	Conference
Event URL	<a href="https://attend.ieee.org/wf-5g/">https://attend.ieee.org/wf-5g/</a>
Dissemination type	Session at the IEEE 5G World Forum conference
Dissemination title	Leveraging existing testbed infrastructure know-how leading to SLICES
Dissemination URL	<a href="https://attend.ieee.org/wf-5g/8951-2/">https://attend.ieee.org/wf-5g/8951-2/</a>
Type of audience	Academia and governmental agencies
Size of audience	Not communicated by the organiser
Countries addressed	EU and worldwide

**Third-party Event #5**



Event Name	IPv6 Enhanced innovation (IPE#4) Plenary and workshop
Partners involved	IoT Lab, MI
Organiser(s)	ETSI ISG IPE
Date	October 26, 2021
Location	Online
Event Category	Plenary of ETSI Industry Specification Group (ISG) IPv6 Enhanced innovation (IPE)
Event URL	-
Dissemination type	Session in relation to standardisation of IPv6
Dissemination title	News from IPE#04 Plenary and Workshop
Dissemination URL	<a href="https://www.etsi.org/newsroom/blogs/entry/news-from-ipe-04-plenary-and-workshop">https://www.etsi.org/newsroom/blogs/entry/news-from-ipe-04-plenary-and-workshop</a>
Type of audience	Industry
Size of audience	40
Countries addressed	EU and worldwide

**Third-party Event #6**

Event Name	3 <sup>rd</sup> Buffalo Wireless Day
Partners involved	SU
Organiser(s)	University at Buffalo, Northeastern University & Florida Atlantic University (USA)
Date	November 19, 2021
Location	Virtual
Event Category	Workshop
Event URL	<a href="http://www.acsu.buffalo.edu/~guan/wirelessday/2021.html">http://www.acsu.buffalo.edu/~guan/wirelessday/2021.html</a>
Dissemination type	Serge Fdida attended as a speaker in the Panel “Testbeds Sharing and Federation for Wireless Research: Challenges and the Road Ahead” and presented SLICES.
Dissemination title	3rd Buffalo Day for 5G and Wireless Internet of Things
Dissemination URL	-
Type of audience	Academia
Size of audience	Not communicated by the organiser
Countries addressed	USA

**Third-party Event #7**

Event Name	HRDA (Hungarian Research Data Alliance) Assembly
Partners involved	SZTAKI

Organiser(s)	HRDA
Date	December 7, 2021
Location	Budapest, Hungary
Event Category	Meeting
Event URL	<a href="https://science-research-data.hu/en">https://science-research-data.hu/en</a>
Dissemination type	Presentation
Dissemination title	ELKH Data Repository Project
Dissemination URL	<a href="https://science-research-data.hu/en">https://science-research-data.hu/en</a>
Type of audience	HRDA members: academia and governmental agencies
Size of audience	Not communicated by the organiser
Countries addressed	Hungary

### Third-party Event #8

Event Name	IoTbDS 2022
Partners involved	SZTAKI
Organiser(s)	Masaryk University, Czech Republic
Date	April 22-24, 2022
Location	Online
Event Category	Conference
Event URL	<a href="https://iotbds.scitevents.org/?y=2022">https://iotbds.scitevents.org/?y=2022</a>
Dissemination type	Session at the IoTbDS 2022 conference
Dissemination title	Session on Cloud and Edge Computing
Dissemination URL	<a href="https://www.insticc.org/node/technicalprogram/iotbds/2022/session/P18403">https://www.insticc.org/node/technicalprogram/iotbds/2022/session/P18403</a>
Type of audience	academia
Size of audience	Not communicated by the organiser
Countries addressed	EU

### Third-party Event #9

Event Name	IEEE Future Networks Testbed Requirements, Challenges and Opportunities
Partners involved	SU
Organiser(s)	IEEE
Date	February 7-8, 2022
Location	Online
Event Category	Conference





Event URL	<a href="https://futurenetworks.ieee.org/conferences/fn-testbed-workshop">https://futurenetworks.ieee.org/conferences/fn-testbed-workshop</a>
Dissemination type	Serge Fdida gave a talk titled "SLICES: European Scientific Large-Scale Infrastructure for Computing/Communication Experimental Studies"
Dissemination title	IEEE Future Networks Testbed Requirements, Challenges and Opportunities
Dissemination URL	<a href="https://futurenetworks.ieee.org/conferences/fn-testbed-workshop">https://futurenetworks.ieee.org/conferences/fn-testbed-workshop</a>
Type of audience	Academia and industry
Size of audience	-
Countries addressed	International

**Third-party Event #10**

Event Name	ELKH Cloud event
Partners involved	SU, SZTAKI
Organiser(s)	ELKH Cloud
Date	February 15, 2022
Location	Virtual
Event Category	Conference
Event URL	<a href="https://science-cloud.hu/en/presentations/slices-european-scientific-large-scale-infrastructure-computingcommunication">https://science-cloud.hu/en/presentations/slices-european-scientific-large-scale-infrastructure-computingcommunication</a>
Dissemination type	Serge Fdida made a presentation "SLICES - European Scientific Large-Scale Infrastructure for Computing / Communication Experimental Studies".
Dissemination title	Inauguration ceremony of the enhanced ELKH Cloud infrastructure
Dissemination URL	<a href="https://science-cloud.hu/en/presentations/slices-european-scientific-large-scale-infrastructure-computingcommunication">https://science-cloud.hu/en/presentations/slices-european-scientific-large-scale-infrastructure-computingcommunication</a>
Type of audience	Academia & Industry
Size of audience	-
Countries addressed	EU (special focus on Hungary)

**Third-party Event #11**

Event Name	ICSCT 2022
Partners involved	SU
Organiser(s)	Duy Tan University
Date	April 2-4, 2022
Location	Danang, Vietnam / hybrid conference
Event Category	Conference
Event URL	-



Dissemination type	Keynote Speech on European Scientific Large-Scale Infrastructure for Computing / Communication Experimental Studies (SLICES).
Dissemination title	2022 11 <sup>th</sup> International Conference on Software and Software and Computing Technologies
Dissemination URL	-
Type of audience	Academia
Size of audience	-
Countries addressed	International

**Third-party Event #12**

Event Name	NCSU
Partners involved	SU
Organiser(s)	North Carolina State University
Date	May 30-31, 2022
Location	Raleigh, USA
Event Category	Meeting
Event URL	-
Dissemination type	Collaboration meeting and presentation of SLICES
Dissemination title	NCSU partnership meeting
Dissemination URL	-
Type of audience	Academia
Size of audience	-
Countries addressed	USA

**Third-party Event #13**

Event Name	MERIF'22 workshop
Partners involved	SU, IMEC
Organiser(s)	MERIF (Midscale Experimental Research Infrastructure Forum)
Date	June 1-3, 2022
Location	Madison, USA
Event Category	Workshop
Event URL	<a href="https://sites.google.com/a/us-ignite.org/merif-workshop-2020/2022-agenda">https://sites.google.com/a/us-ignite.org/merif-workshop-2020/2022-agenda</a>
Dissemination type	Presentation of SLICES
Dissemination title	MERIF Workshop 2022



Dissemination URL	<a href="https://sites.google.com/a/us-ignite.org/merif-workshop-2020/2022-agenda">https://sites.google.com/a/us-ignite.org/merif-workshop-2020/2022-agenda</a>
Type of audience	Academia & Industry
Size of audience	50
Countries addressed	USA

#### Third-party Event #14

Event Name	IWSG'2022, 14 <sup>th</sup> International Workshop on Science Gateways
Partners involved	SZTAKI
Organiser(s)	University of Trento, Italy
Date	June 15-17, 2022
Location	Trento, Italy
Event Category	Workshop
Event URL	<a href="https://iwsgateways.github.io/iwsg2022/">https://iwsgateways.github.io/iwsg2022/</a>
Dissemination type	Keynote speech at the workshop.
Dissemination title	Lessons learnt from building a research cloud infrastructure in Hungary
Dissemination URL	<a href="https://iwsgateways.github.io/iwsg2022/program_iwsg2022.pdf">https://iwsgateways.github.io/iwsg2022/program_iwsg2022.pdf</a>
Type of audience	Researchers, scientists, and development engineers
Size of audience	-
Countries addressed	EU

#### Third-party Event #15

Event Name	Science   Business & Elsevier expert workshop
Partners involved	Sorbonne University
Organiser(s)	Science   Business & Elsevier
Date	June 16, 2022
Location	Brussels
Event Category	Workshop
Event URL	<a href="https://sciencebusiness.net/events/investment-challenge-how-assess-impact-research-infrastructures">https://sciencebusiness.net/events/investment-challenge-how-assess-impact-research-infrastructures</a>
Dissemination type	Presentation on SLICES
Dissemination title	The investment challenge: How to assess the impact of research infrastructures?
Dissemination URL	<a href="https://sciencebusiness.net/events/investment-challenge-how-assess-impact-research-infrastructures">https://sciencebusiness.net/events/investment-challenge-how-assess-impact-research-infrastructures</a>
Type of audience	Industry, Business



Size of audience	-
Countries addressed	EU and worldwide

**Third-party Event #16**

Event Name	WueWoWAS'22, Würzburg Workshop on Next-Generation Communication Networks
Partners involved	TUM
Organiser(s)	VDE ITG
Date	July 11-13, 2022
Location	Würzburg, Germany
Event Category	Workshop
Event URL	<a href="https://lsinfo3.github.io/WueWoWas2022/">https://lsinfo3.github.io/WueWoWas2022/</a>
Dissemination type	Paper presentation at the workshop
Dissemination title	Reproducible by Design: Network Experiments with pos
Dissemination URL	<a href="https://www.net.in.tum.de/fileadmin/bibtex/publications/papers/gallenmueller_wuewowas2022.pdf">https://www.net.in.tum.de/fileadmin/bibtex/publications/papers/gallenmueller_wuewowas2022.pdf</a>
Type of audience	researchers from industry and academia
Size of audience	30
Countries addressed	EU

**Third-party Event #17**

Event Name	6G Symposium
Partners involved	UOULU
Organiser(s)	6GWorld and UOULU in collaboration with the 6G Flagship Program
Date	May 23-25, 2022
Location	Online
Event Category	Conference
Event URL	<a href="https://www.6gworld.com/6gsymposium-spring-2022/">https://www.6gworld.com/6gsymposium-spring-2022/</a>
Dissemination type	Seminar, 3 days
Dissemination title	It is evident that 6G will contain elements that are a natural extension of 5G and 5G-Advanced, and will in some ways build on the business disruptions already being felt today.
Dissemination URL	<a href="https://www.6gworld.com/6gsymposium-spring-2022/">https://www.6gworld.com/6gsymposium-spring-2022/</a>
Type of audience	Industry, Academia
Size of audience	~3000
Countries addressed	EU and worldwide



Third-party Event #18	
Event Name	5G TEST NETWORKS AROUND THE GULF OF BOTHNIA
Partners involved	UOULU
Organiser(s)	Luleå University of Technology and UOULU in collaboration with the Arctic 5GTN Project
Date	June 15th 2022
Location	University of Oulu and Online
Event Category	Info Day
Event URL	<a href="http://arctic5g.eu/news-43544284">http://arctic5g.eu/news-43544284</a>
Dissemination type	Half a day seminar
Dissemination title	Follow an event where Luleå Technical University and University of Oulu will present their 5G test networks and testing opportunities they offer.
Dissemination URL	<a href="http://arctic5g.eu/news-43544284">http://arctic5g.eu/news-43544284</a>
Type of audience	Industry, Academia
Size of audience	~50
Countries addressed	Finland and Sweden

Third-party Event #19	
Event Name	Arctic 5G Test Network seminar
Partners involved	UOULU
Organiser(s)	Luleå University of Technology and UOULU in collaboration with the Arctic 5GTN Project
Date	August 24th 2022
Location	Luleå University of Technology and Online
Event Category	Info Day
Event URL	<a href="http://arctic5g.eu/news-43544284">http://arctic5g.eu/news-43544284</a>
Dissemination type	Half a day seminar
Dissemination title	Find out more about 5G and edge in the mining sector, leveraging 5G for Industry 4.0 as well as offloading processing and object recognition using edge cloud from Ericsson.
Dissemination URL	<a href="http://arctic5g.eu/news-43544284">http://arctic5g.eu/news-43544284</a>
Type of audience	Industry, Academia
Size of audience	~50
Countries addressed	Sweden and Finland

The following tables lists future potential third parties' events to disseminate the SLICES project results:



Table 3: List of future potential third parties' events

Name	Description	Link	Date
PIMRC	IEEE International Symposium on Personal, Indoor and Mobile Radio Communications	<a href="https://pimrc2022.ieee-pimrc.org/">https://pimrc2022.ieee-pimrc.org/</a>	Sep 2022
IEEE 5G World Forum	5G Forum	<a href="https://ieee-wf-5g.org/">https://ieee-wf-5g.org/</a>	Oct 2022
ICRI2022	International Conference on Research Infrastructures 2022, Brno, CZ	<a href="https://www.icri2022.cz">https://www.icri2022.cz</a>	Oct 2022
WGC	Wireless Global Congress hosted by Wireless Broadband Alliance	<a href="https://www.wirelessglobalcongress.com/">https://www.wirelessglobalcongress.com/</a>	Oct 2022
DAW	Digital Around the World 2022	<a href="https://digitalaroundtheworld.org">https://digitalaroundtheworld.org</a>	October 20-21, 2022
Cloudnet	IEEE International Conference on Cloud Networking	<a href="https://cloudnet2022.ieee-cloudnet.org/">https://cloudnet2022.ieee-cloudnet.org/</a>	Nov 2022
GLOBECOM	IEEE Global Communications Conference	<a href="https://globecom2022.ieee-globecom.org/">https://globecom2022.ieee-globecom.org/</a>	Dec 22
MWC	Mobile World Congress	<a href="https://www.mwcbarcelona.com/">https://www.mwcbarcelona.com/</a>	Feb-Mar 2023
WCNC	IEEE Wireless Communications and Networking Conference	<a href="https://wcnc2023.ieee-wcnc.org/">https://wcnc2023.ieee-wcnc.org/</a>	Mar 2023
INFOCOM	IEEE International Conference on Computer Communications	<a href="https://infocom2023.ieee-infocom.org/">https://infocom2023.ieee-infocom.org/</a>	May 2023
CCW	TCCA Critical Communications World	<a href="https://critical-communications-world.com/">https://critical-communications-world.com/</a>	May 2023
IoT WEEK	IoT Week	<a href="https://iotweek.org/">https://iotweek.org/</a>	June 2023
EuCNC & 6G Summit	European Conference on Networks and Communications	<a href="https://www.eucnc.eu/">https://www.eucnc.eu/</a>	June 2023



#### 4. Academic outreach and academic exploitation

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Education in recent years has slowly transitioned to an online model, allowing access to a massive number of online courses from virtually anywhere. The adoption of such educational models was boosted by the global pandemic in 2020, with universities and other degree programs quickly transitioning to such schemes. Although such a model is apt for lecture-based courses, hands-on training remains a puzzle on how it can transition to remote learning. The offering of SLICES through the remote access to infrastructure and data created over this infrastructure is in line with such online education demands, as data and resources can be used for training future professionals remotely.

SLICES-SC consortium decided to organise SLICES Academy. There are specific needs for SLICES Academy as described below:

- Need for the development of a high-performing digital education ecosystem in advanced networking systems and technologies seeking to organise new curricula aiming to enhance researchers' competencies and skills;
- Need to support the delivery of high-quality education;
- Need for the development of new skills and competencies in advanced digital technologies;
- Need for boosting innovation and digital competencies in all educational institutions;
- Need for open education systems.

The objectives of SLICES academy are:

- SLICES develops new educational material that can be organised in order to support the needs of the community;
- Educational material can be collected from different partners/sources, such as summer school, hackathons, etc.;
- SLICES has the tools and the resources to support the development of the Academy.

#### 5. Standardisation

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##### 5.1. Overall methodology and strategy for standardisation

This section presents the methodology used for the standardisation strategy in the context of the SLICES-SC project. The methodology consists of the following steps:

1. The deliverable D6.1 mentions the key priorities for Europe in terms of standardisation in the domain of large-scale infrastructures. The Rolling Plan for ICT Standardisation written by the European Commission is the starting point, and the key priorities extracted from the Rolling Plan for ICT Standardisation are presented in the deliverable D6.1.
2. The deliverable D6.1 describes the assets of the project to be considered for the standardisation process;
3. The relevant Standards Developing Organisations (SDOs) which the project needs to collaborate with are presented in the deliverable D6.1;
4. The deliverable D6.1 lists all the lead partners contributing to the standardisation activities in the SLICES-SC;
5. The synthetic strategy for the standardisation is presented in the deliverable D6.1;



6. The upcoming timeline for the standardisation activities to be conducted in the project is proposed in this deliverable;
7. The results of the standardisation are explained in this document;
8. The takeaways and recommendations concerning the standardisation are presented in the deliverable below.
9. Finally, a conclusion closes the standardisation chapter.

## 5.2. Upcoming timeline

This section presents the events organised by the different identified SDOs where potential contributions on behalf of the SLICES-SC project could be made. The dates correspond to the information retrieved during the writing of this deliverable and can be changed by the SDOs at any time.

Table 4: Upcoming timeline

SDO	Working Group /Study Group	Date	Location
5G-PPP	Software Networks Working Group	TBC	
ITU-T	SG11 WP1/11, WP2/11, WP3/11 and RGM	28 November – 7 December 2022	Geneva
	SG11	26 April – 5 May 2023	TBC
	FG-TBFxG	14-16 November 2022	Virtual
ETSI	TC INT	29 November – 1 December 2022	Sophia-Antipolis, FR
	ISG IPE	06-09 September 2022	Sophia-Antipolis, FR
		25 October 2022	Virtual
		22 November 2022	Virtual

## 5.3. Standardisation results

The table below lists all the events related to the standardisation attended by the partners of SLICES.





Table 5: Previous events

SDO	Working Group /Study Group	Date	Location
ITU-T	SG11	1-10 December 2021	Virtual
	FG-TBFxG	4-7 April 2022	Virtual
		19-21 July 2022	Virtual
	FG-TBFxG WG2	30 May 2022	Virtual
		27 June 2022	Virtual
ETSI	ISG IPE	14 September 2021	Virtual
		26 October 2021	Virtual
		16 November 2021	Virtual
		7 December 2021	Virtual
		25 January 2022	Virtual
		22 February 2022	Virtual
		29 March 2022	Virtual
		26 April 2022	Virtual
		31 May 2022	Virtual
		28 June 2022	Virtual

Concerning the meetings organised in the context of ITU-T, the ITU-T SG11 meeting held in December 2021 permits the official acceptance and the creation of the ITU-T Focus Group on Testbeds Federations for IMT-2020 and beyond (FG-TBFxG). As mentioned previously, the Focus Group is dedicated to harmonising specifications used to interconnect, integrate and federate testbeds. The Focus Group is collecting and defining use cases and requirements for testbeds federations. Specific APIs are specified by the Focus Group based on the previous work described in the Recommendation ITU-T Q.4068 “Open APIs for interoperable testbed federations”. The goal is also to provide future services from the testbeds through the Testbed as a Service (TaaS) concept.

The ITU-T Focus Group FG-TBFxG is covering all the topics or assets to be standardised and identified in the previous deliverable:

- Architecture of the testbed federation;
- Testbed/Network interconnection;



- Interoperability and integration;
- Testbed/Infrastructure monitoring and management;
- Experiment setup and monitoring.

More information, notably on the future meetings which are open to almost everybody, is available on the dedicated Web page on the ITU-T Website: <https://www.itu.int/en/ITU-T/focusgroups/tbfxg/Pages/default.aspx>

The ETSI Industry Specification Group (ISG) IPv6 Enhanced Innovations (IPE) is also an interesting room where the interconnection and the interoperability of components or services through IPv6 are discussed. The ETSI ISG IPv6 is also working on the establishment of test specifications for IoT devices, in particular 6TiSCH and 6LoWPAN. The final version of such test specifications could be implemented by the SLICES testbeds which are specialised in IoT like the IoT Lab testbed hosted in Geneva.

The contributions of the partners are listed in the table below.

*Table 6: Contributions to standardisation*

Document Title	Document Type	Submission Date	Organisation	Consortium Contributors
Presentation IoT and 6TiSCH	Presentation	14 September 2021	ETSI ISG IPE	MI, IoT Lab
IoT & 6TiSCH	Presentation	26 October 2021	ETSI ISG IPE	MI, IoT Lab
IoT & 6TiSCH	Presentation	16 November 2021	ETSI ISG IPE	MI, IoT Lab
IoT 6TiSCH Presentation	Presentation	25 January 2022	ETSI ISG IPE	MI, IoT Lab
IoT and 6TiSCH Presentation	Presentation	22 February 2022	ETSI ISG IPE	MI, IoT Lab
IoT and 6TiSCH Presentation	Presentation	29 March 2022	ETSI ISG IPE	MI, IoT Lab
User requirements and reference model for Testbed as a Service	Contribution	04-07 April 2022	ITU-T FG-TBFxG	MI
Testbed as a Service API and interoperability specifications	Contribution	04-07 April 2022	ITU-T FG-TBFxG	MI
Presentation on the Recommendation ITU-T Q.4068	Presentation	04-07 April 2022	ITU-T FG-TBFxG	MI
FG-TBFxG WG3: Testbeds Federations APIs, Reference Model	Contribution	04-07 April 2022	ITU-T FG-TBFxG	MI



Instantiations: Reference Points/APIs; Key Players for Testbeds Federations for 5G & Beyond				
Lessons learned from running the testbed Federation Fed4FIRE for 10 years	Contribution	04-07 April 2022	ITU-T FG-TBFxG	IMEC
Lessons learned from running the testbed Federation Fed4FIRE for 10 years	Presentation	04-07 April 2022	ITU-T FG-TBFxG	IMEC
The pos Framework: A Methodology and Toolchain for Reproducible Network Experiments	Presentation	7-8 April 2022	3. KuVs Fachgespräch "Network Softwarization"	TUM
IoT and 6TiSCH Presentation	Presentation	26 April 2022	ETSI ISG IPE	MI, IoT Lab
Input – draft Technical Specification D2.1 "User requirements and reference model for Testbed as a Service", FG-TBFxG virtual meeting, 30 May 2022	Contribution	30 May 2022	FG-TBFxG WG2	MI
Input – draft Technical Specification D2.2 "Testbed as a Service API and interoperability specifications", FG-TBFxG virtual	Contribution	30 May 2022	FG-TBFxG WG2	MI



meeting, 30 May 2022				
IoT and 6TiSCH presentation	Presentation	31 May 2022	ETSI ISG IPE	MI, IoT Lab
IPv6 IoT Ready Test Specification	Contribution	31 May 2022	ETSI ISG IPE	MI, IoT Lab
Input – draft Technical Specification D2.1 “User requirements and reference model for Testbed as a Service”, FG-TBFxG virtual meeting, 27 June 2022	Contribution	27 June 2022	FG-TBFxG WG2	MI
Input – draft Technical Specification D2.2 “Testbed as a Service API and interoperability specifications”, FG-TBFxG virtual meeting, 27 June 2022	Contribution	27 June 2022	FG-TBFxG WG2	MI
IoT Interoperability Test Specification	Contribution	28 June 2022	ETSI ISG IPE	MI, IoT Lab

In the context of the activities undertaken in the ETSI Industry Specification Group (ISG) IPv6 Enhanced Innovations (IPE), Mandat International and IoT Lab are in charge to lead and coordinate the work to elaborate a test specification on IoT for the IoT Ready Logo Programme managed by the IPv6 Forum (<https://www.ipv6forum.com/>). This program is similar to the IPv6 Ready Logo Programme also led by the IPv6 Forum, but specifically designed for the Internet of Things devices. Mandat International and IoT Lab are responsible to report in the ETSI ISG IPE the progress concerning this test specification. Two first versions were submitted to ETSI ISG IPE for comments at the end of the first semester of 2022.

IMEC and Mandat International have actively participated and contributed to the two first meetings organised by the ITU-T Focus Group FG-TBFxG on Testbeds Federations for IMT-2020 and beyond. First of all, IMEC and Mandat International have presented the work achieved in Fed4FIRE+, including the Recommendation ITU-T Q.4068. This Recommendation was realised in the context of the Fed4FIRE+ project and serves as a basis for not only the FG-TBFxG Focus Group, but also as a reference document for the technical activities done in SLICES-DS. Indeed, the standardisation doesn't consist only to write contributions to SDOs, but also to examine the results of standardisation previously achieved; in this context, the Recommendation ITU-T Q.4068 provides some solutions to integrate and



make interoperable testbeds, which one of the objectives defined in the SLICES-DS and SLICES-SC projects.

Furthermore, in the FG-TBFxG Focus Group, Mandat International is leading Working Group 2 (WG2) on Testbeds as a Service since the first online meeting. The official description of this WG is given below and directly mentioned the future SLICES Research Infrastructure:

*“This Working Group will elaborate on the requirements and reference model with properties of relevance for delivering testbed as a service, to complement and extend Q.4068. It will more particularly focus on the user interface, services, and requirements to address end-user needs when remotely accessing testbeds in order to deliver adequate user experience. From this point, the Working Group will elaborate the related terms and definitions, requirements, reference model with properties of relevance for TaaS, and interoperability specifications for virtualizing and delivering modular and scalable Testbed as a Service (TaaS) on top of existing and future testbed infrastructures, including federated ones. Furthermore, the TaaS will be able to list the assets provided by the different testbeds and expose them through a dedicated APIs based on the Recommendation Q.4068. Some KPIs concerning specially the TaaS will be also determined. The Working Group will also study the integration, the interoperability and the extensibility of the Testbed as a Service.*

*This WG will also use the experience acquired by international research projects in this domain, such as F-Interop (<https://www.finterop.eu/>), Fed4FIRE+ (<https://www.fed4fire.eu/>), PAWR (<https://advancedwireless.org/>), and SLICES (<https://slices-ri.eu/>).”*

Working Group 2 is producing two deliverables with Mandat International as the main editor:

- D2.1 Technical Specification: User requirements and reference model for Testbed as a Service. This deliverable presents the specific requirements for TaaS with the user’s perspective.
- D2.2 Technical Specification: Testbed as a Service API and interoperability specifications. This document is specifying the API or the set of APIs dedicated exclusively to TaaS.

A basic version of the two deliverables was presented during the first virtual meeting of the ITU-T Focus Group. Two intermediate remote meetings of FG-TBFxG WG2 were organised in May and June 2022 between the two plenary FG-TBFxG meetings. These online meetings permitted presenting and explaining the new content of the two WG2 deliverables. In particular, the deliverable WG2 D2.1 is composed of a list of requirements provided by public deliverables from former projects (IoT Lab, F-Interop, Fed4FIRE+) and current projects (SLICES-DS and SLICES-SC) working on the aspects linked to the Testbed as a Service (TaaS). In particular, the two following public deliverables produced by SLICES were used to realise the deliverable WG2 D2.1:

- SLICES-DS Deliverable D2.2 “SLICES as Service, baseline”
- SLICES-SC Deliverable D2.1 “Requirements analysis for exposing the RI”

In summary, both projects have directly contributed to the deliverable WG2 D2.1 in the Focus Group FG-TBFxG. It has to be noted that the version of the deliverables WG2 D2.1 and D2.2 discussed during the second intermediate FG-TBFxG WG2 meeting held on the 27<sup>th</sup> of June 2022 were automatically considered as input documents for the second plenary meeting of the Focus Group: it is the reason why these two contributions are not mentioned as contributions for the second plenary meeting of FG-TBFxG above. The second virtual plenary meeting of ITU-T Focus Group on Testbeds Federations for IMT-2020 and beyond (FG-TBFxG) was attended by IMEC and Mandat International.



#### **5.4. Takeaways and recommendations**

At the time of writing, 21 contributions were made to the SDOs; 10 of them are contributions made by several partners. Furthermore, 13 events organised by SDOs were attended by the partners; some events like the ITU-T Focus Group FG-TBFxG were attended by two SLICES-SC partners.

The main recommendation is to continue the current work undertaken for the standardisation. The standardisation activities require several iterations of the contributions before being successfully accepted by the different SDOs. Another recommendation is to inform the other partners about the individual activities of standardisation realised individually by each partner. Furthermore, the standardisation consists also to reuse standards available already in the fields and published by the different SDOs. Typically, the standards concerning the open data are also of interest for the SLICES Research Infrastructure to ensure the good implementation of the FAIR principles.





## 6. Conclusion

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Deliverable 6.2 presented the Mid-term Report on Dissemination, outreach, community building and standardisation of SLICES-SC.

Communication activities, complemented by dissemination and standardisation efforts, are indispensable throughout the project's lifetime and interwoven into all the WPs.

The present deliverable serves as a tool for all Consortium members to monitor their communication activities, as it lists the target audience, communication channels, tools, activities and corresponding key performance indicators.

Regarding the communication and dissemination of SLICES-SC, a multi-channel approach is being applied. The project's website serves as the main platform for general information on SLICES-SC and enables visitors to access the social media channels, the blog and publications. For both the social media channels and the blog, a country-based node approach is being used, bringing partners in the same country to coordinate their communication contributions within their node.

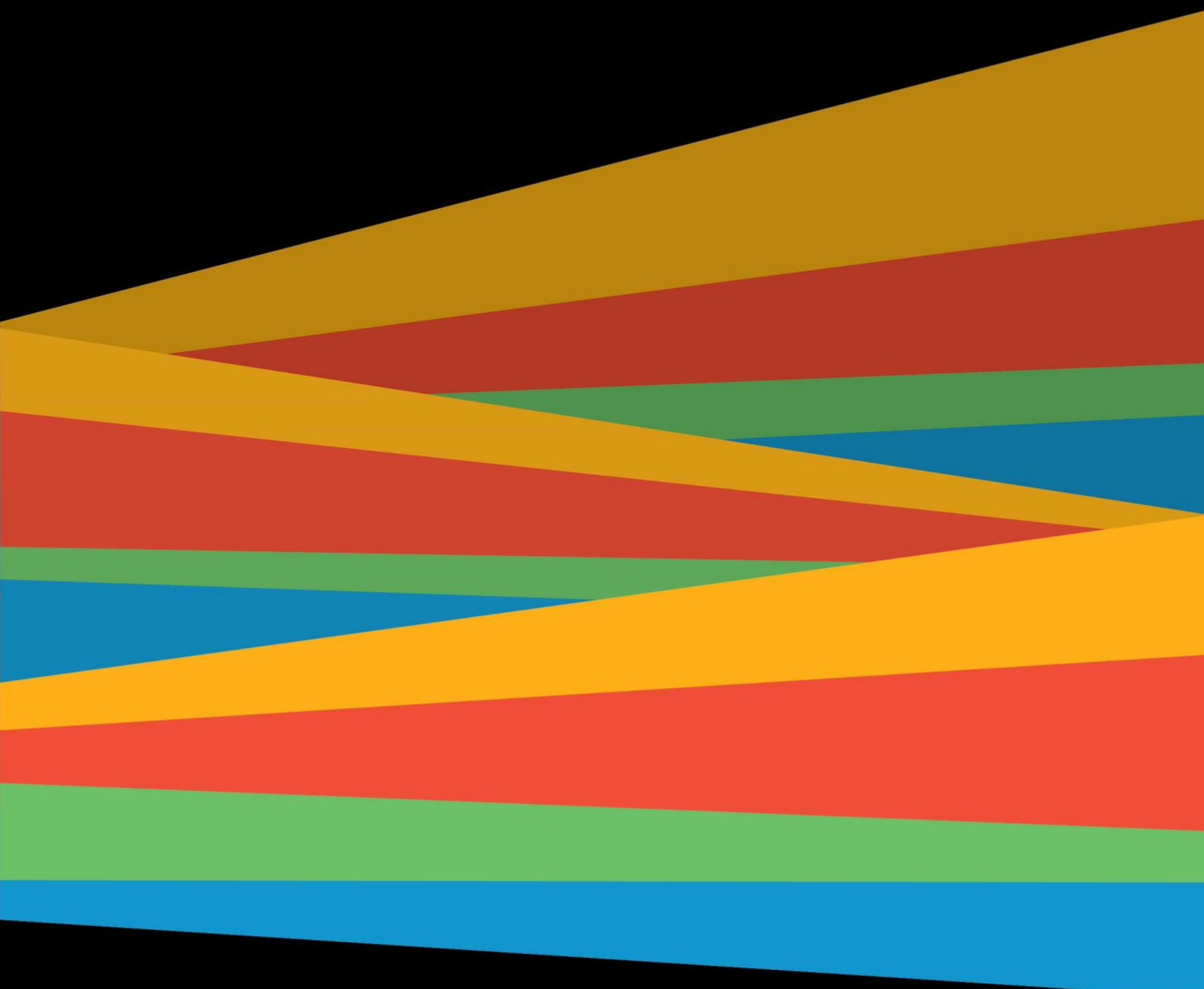
Furthermore, awareness about the technical excellence of SLICES RI is also fostered with the publication of scientific articles. The project is on track to fulfil its specific dissemination KPIs as the number of accepted/published journal papers in the mid-term is 3 (two of them are 100% relevant to SLICES-SC), while the number of accepted/published conference papers in the mid-term is 5.

Concerning standardisation, the strategy defined in the first deliverable was put in place with success. Good organisation and coordination were achieved for the standardisation activities addressed by SLICES-SC. The current results of standardisation are aligned with the objectives defined in the related KPIs. All the topics specified in deliverable D6.1 are handled in the SDOs identified through the survey:

- Architecture of the testbed federation;
- Testbed/Network interconnection;
- Interoperability and integration;
- Testbed/Infrastructure monitoring and management;
- Experiment setup and monitoring.

Initial contributions were made to the identified SDOs with positive feedback permitting to improve the newest versions of the contributions written by the different project partners.

This is a living document to accommodate any customisation required. The outreach planning will thus be constantly evaluated and revised during the project duration.



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