slices SC

HORIZON 2020

H2020 - INFRAIA-2020-1

D6.1 Dissemination, outreach, community building and standardisation Plan

Acronym	SLICES-SC
Project Title	Scientific Large-scale Infrastructure for Computing/Communication Experimental Studies – Starting Community
Grant Agreement	101008468
Project Duration	36 Months (01/03/2021 – 29/02/2024)
Due Date	31 August 2021 (M6)
Submission Date	21 September 2021 (M7)
Authors	Anna Brékine (IoT Lab), Cédric Crettaz (MI)
Reviewers	Émilie Mespoulhes (SU)

Scientific Large-scale Infrastructure for Computing Communication Experimental Studies **Starting Communities**

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101008468. The information, documentation and figures available in this deliverable, is written by the SLICES-SC project consortium and does not necessarily reflect the views of the European Commission. The European Commission is not responsible for any use that may be made of the information contained herein.

Executive summary

The objective of this document is to define the dissemination, outreach, community building and standardisation strategy and plan, and describe the activities. SLICES-SC partners will enforce the plan to ensure broad visibility, promotion and uptake of the project. The deliverable offers an overview of the dissemination strategy of SLICES-SC, including target groups, dissemination channels and tools, as well as events. SLICES-SC will organise project-related events and aims to capitalise on several third-party events to maximise visibility and reach a broader range of stakeholders. This plan covers branding, the project website, social media channels, as well as the project's dissemination materials such as leaflets/brochures. The monitoring of the execution of the dissemination, outreach and community building is carried out through the alignment with the KPIs of the dissemination plan leading up to the completion of the project. This deliverable also covers the standardisation plan that identifies relevant topics, standard developing organisations, partners and timeframes to accomplish the standardisation task.

Table of content

Table of figures

Table of tables

1. Introduction

1.1. SLICES-SC at a glance

SLICES-SC aspires to (i) foster the research community around this ecosystem, (ii) create and strengthen necessary links with relevant industrial stakeholders for the exploitation of the infrastructure, (iii) advance existing methods for research reproducibility and experiment repeatability, and (iv) design and deploy the necessary solutions for providing SLICES-RI with an easy to access scheme for multi-disciplinary users. A set of detailed research activities has been designed to materialise these efforts in tools for providing (i) transnational (remote and physical) access to the facility, as well as (ii) virtual access to the data produced over the facilities. The respective networking activities of SLICES-SC aspire to foster the community around these infrastructures and open up to new disciplines and industrial stakeholders.

1.2. Intended audience

This document targets SLICES-SC consortium members and aims to develop a practical and integrated approach to dissemination, outreach, community building and standardisation activities and contribute to the overall objectives of the project.

1.3. Document structure

The document is structured into the following sections:

- Chapter 1 – Introduction
- Chapter 2 – Dissemination and community building plan
- Chapter 3 – Means and activities
- Chapter 4 – Academic outreach and exploitation
- Chapter 5 – Overall methodology and strategy for standardisation
- Chapter 6 – Relevant EU Frameworks for SLICES-SC standardisation
- Chapter 7 – SLICES-SC identified assets for standardisation (what)
- Chapter 8 – SLICES-SC identified SDOs for standardisation (where)
- Chapter 9 – SLICES-SC lead partners in standardisation (who)
- Chapter 10 – Synthetic strategy for standardisation
- Chapter 11 – Upcoming timeline
- Chapter 12 – Conclusion
- Annexes

2. Dissemination and community building plan

2.1. SLICES-SC dissemination objectives

The main objectives of the SLICES-SC dissemination and communication strategy are to:

- Define a clear and distinctive brand identity for the SLICES-SC. The SLICES-SC brand identity will be consistent online and offline, and it will represent the cornerstone values of SLICES-SC: participation, knowledge, openness, testbeds federation, experimental facilities, wireless networking, IoT and cloud services;
- Ensure broad visibility of SLICES-SC's work and disseminate its results towards the targeted stakeholder groups to effectively promote the SLICES-SC offering for significant uptake;
- Facilitate the exploitation of SLICES-SC outcomes for the partners, together and individually;
- Ensure broad visibility and promotion of SLICES-SC as the new European Research experimental facility in wireless networking, IoT and Cloud, beyond the programme borders via strategic and operational coordination of the specific communities through dedicated efforts embracing all target stakeholders and user communities;
- Support the sustainability of SLICES-SC for the subsequent phases of the ESFRI lifecycle.

2.2. SLICES-SC dissemination strategy

The dissemination strategy and activities follow principles and best practices successfully tested by the partners and in line with the EC Guidelines for successful dissemination. The focal point of the SLICES-SC overall dissemination strategy is the identification and mapping of targeted stakeholders (whom to disseminate to) and the understanding of their needs and characteristics to tailor clear and concise messages (what to disseminate) to the different target audiences. This also comes to ensure the use of the most appropriate and efficient dissemination channels and communication tools and drive the development of proper material per target stakeholders (how to disseminate). It further defines a time plan (when to disseminate), based on which 3 phases are introduced. Each phase will dispose of specific objectives and target focuses, assisting all project partners in implementing communication activities and reaching the dissemination and exploitation objectives throughout SLICES-SC implementation. Furthermore, focusing on reaching a wider audience beyond the main targeted stakeholders of SLICES-SC, the Dissemination Strategy will outline liaison and networking activities with other EC projects, initiatives and networks that will further enhance the dissemination range and impact.

2.3. Target audiences

SLICES-SC target groups as initially identified are listed hereby. As represented in the table and Figure below, the main SLICES-SC stakeholders are identified as:

Table 1: Target audiences

Beneficiaries	Main objective	Method/Material
Scientific community at Universities and research centres	Promote SLICES-RI both to raise awareness and also to attract users for the RI. Explore educational use cases.	Flyers, Workshops and questionnaires.

Research departments from industry with activity in societal challenges.	To promote the use of the SLICES-RI to industrial user communities.	Questionnaires to collect evaluate the access to the SLICES-RI.
Researchers and SMEs working on products and services on mobile networks	Promote the SLICES-RI and attract new user communities to access the RI.	Dissemination material focused on non-specialists, questionnaires.
Funding and selection agencies managing research infrastructures (ESFRI, e-IRG)	Raise awareness on the need of the experimental facility as SLICES-SC. Provide material to evaluate the accessibility of the facility.	Reports of SLICES-SC covering the accessibility to the RI from different user communities. Deployment and business model plans
National authorities (Government, Ministries, dedicated agencies)	Raise awareness to (i) include SLICES-SC in all relevant national roadmaps, or similar political documents, (ii) obtain Expressions of political Support (EoS), (iii) obtain Expressions of Commitment (EoC) of financial contributions	High-level materials (mission statement, slide-deck, brochure for policymakers)
National and EU regulators as Policymakers	To explore how SLICES-RI could be used from different user communities.	Specific report on the technical and regulatory barriers that limits the use of experimental facilities for research in Europe
Members of 5GPPP	Networking in international initiatives related to testbeds supporting the evolution towards 5G.	Posters, presentations, contributions to white papers, etc.
European initiatives supporting research like the PPPs in big data, security, etc.	Promote SLICES-RI as the way of providing validation at scale on the different programs.	Promotion of the SLICES-RI and its access from different user communities during the info days, engagement with stakeholders.
Standardisation organisations at the global level	Raise awareness about SLICES-SC and establish links with all the international organisations that support research work addressed by SLICES-SC.	Specific report on the technical and regulatory barriers that limits the deployment of SLICES-RI. Invitation to assist to the different project results meetings and workshops
Non-European agencies or institutions	To promote cooperation and to ensure alignment with other initiatives.	Invitation to workshops, direct communications.

Figure 1: SLICES-SC target stakeholders and overall ecosystem

2.4. Communication activities timing

SLICES-SC will follow a phased approach to defining, planning, organising and exploiting a rich set of activities and instruments in the most effective way towards building a strong community in the EU that will make a difference. In respect to the Grant Agreement, the project will follow a 3-phase approach to outreach and impact creation (see Figure below).

In order to achieve more meaningful interactions with different target groups, a set of principles has been adopted and oriented towards the long-term sustainability of SLICES-SC.

- **Long-term relationship building and earning trust**. SLICES-SC will build research, academia and industry respect and recognition, as well as cultivate trust in its ecosystem by leveraging sector-specific expertise and experience;
- **Personalised, multi-channel communication.** SLICES-SC will enhance interactions and foster closer links with its targeted audiences by delivering relevant and personalised messages across various touchpoints of identified ecosystem stakeholders;
- **Empowerment.** SLICES-SC will interact with its target audiences in a mutually beneficial environment, empowering the members of its ecosystem to bypass obstacles in their digital transformation journey.

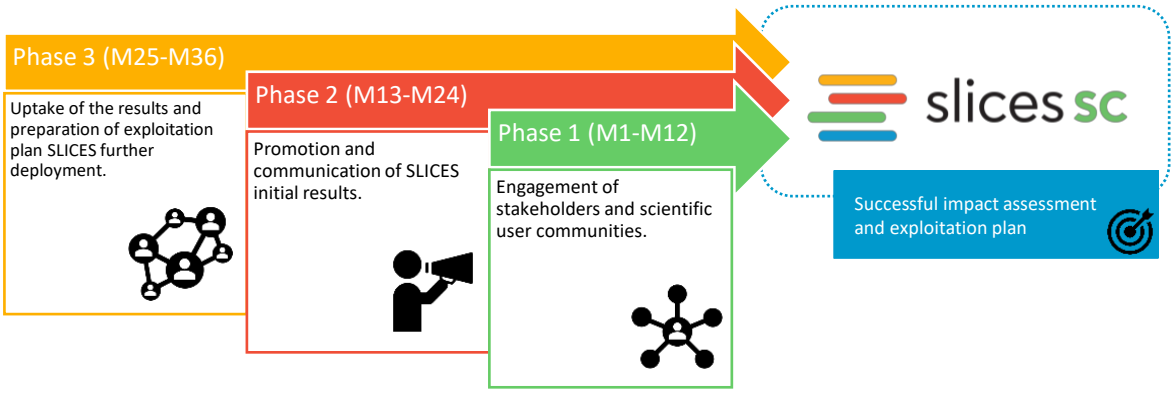


Figure 2: SLICES-SC communication phases

2.5. 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 will serve as the main reference to the Work Package Leader, IoTLab, for monitoring and evaluating the communication activities. In addition to the table, IoTLab will organise regular conference calls at the WP6 level to keep track of the progress and of the partner's individual communication activities.

Table 2: Communication and dissemination KPIs

Measure	Indicators	Target	Means of verification
SLICES-SC brochure (1 with updates every year)	Number of brochures distributed	At least 200 per year	Through the dissemination reporting activities by SLICES-SC partners and online
Posters	Number of posters produced	2 by the end of SLICES-SC	Through the dissemination reporting activities by SLICES-SC partners
Set of high-level materials for policymakers (mission statement, slide-deck, brochure)	Number of sets	At least 1 per year	Through the dissemination reporting activities by SLICES-SC partners
SLICES-SC website	Number of unique visitors to website/page-hits	> 1000 visitors per year	In-built website statistics tool

Social networks	Number of followers in: Twitter YouTube	 > 500 > 100	Keeping the profiles on such networks active via regular posting and monitoring
Workshops regarding SLICES-SC design and demand organised	Number of workshops and number of participants	6 by the end of the project with at least 30 participants at each event	Attendance proofs (e.g., photos, presentations, minutes, videos, interviews)
Summer Schools	Number of summer schools and number of participants	2 by the end of the project with at least 30 participants at each event	Attendance proofs (e.g., photos, presentations, minutes, videos, interviews)
Industry and Local Info Days	Number of info days and number of participants	16 by the end of the project with at least 30 participants at each event	Attendance proofs (e.g., photos, presentations, minutes, videos, interviews)
Videos	Number of videos published on the project's YouTube channel and average number of views	2 videos and >50 views per video	Videos published via the YouTube channel of the project
Scientific publications	Number of peer-reviewed papers/articles	At least 5 by the end of the project	Papers/articles published in proceedings and online
Presentations	Number of presentations made	At least 3 per year	Presentations made available via the project's website
Attended external events	Number of events attended	At least 6 attended external events during the overall project's duration	Attendance proof, presented material, photos, animation of social media channels, events' reports

2.6. Distribution of responsibilities

According to article 38.1.1 of the Grant Agreement, "The beneficiaries must promote the action and its results, by providing targeted information to multiple audiences (including the media and the public) in a strategic and effective manner". Therefore, every opportunity will be embraced collectively at the project level or individually by the SLICES-SC partners to successfully contribute to the communication efforts and share and promote the project's benefits and impact using all available tools.

IoTLab, as Work Package Leader, is the main responsible for coordinating the SLICES-SC WP6 activities. Yet, dissemination, outreach, community building and standardisation activities are the responsibility of the entire Consortium. Therefore, all partners will contribute to the implementation of these activities and support the Work Package Leader when necessary.

2.7. Dissemination monitoring and reporting

To ensure the accurate monitoring and reporting of communication activities, SLICES-SC deliverables include a number of reports linked to dissemination, outreach, community building and standardisation activities. IoTLab will be responsible for drafting the content of these reports with the support of the respective task leaders and will rely on all the partners' participation in communication activities to deliver results and meet the KPIs defined in the Description of the Action (DoA). Furthermore, IoTLab will host regular conference calls at the WP6 level to keep track of the progress and of the partner's individual communication activities.

IoTLab will be in charge of the overall monitoring of all communication activities and will report to the project coordinator in case of any problem. Nonetheless, each partner is responsible for strengthening the impact of the SLICES-SC communication activities by resharing the content and initiating individual efforts on their own communication channels. This process will facilitate stakeholder engagement and contribute to community building.

For dissemination and communication reporting purposes, SLICES-SC will make use of the Project NetBoard platform, where the partners can indicate the past and future events they are attending (see Figure below)

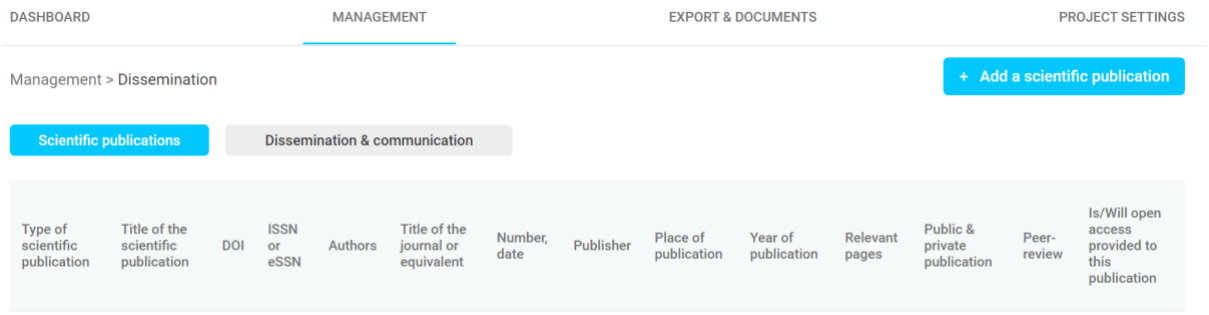


Figure 3: Project NetBoard platform

3. Means and activities

3.1. Project branding

The development of the SLICES-SC brand was a significant step to creating a unified and easily recognisable visual identity for SLICES-SC. The SLICES-SC logo (Figure below) serves as a symbol under the SLICES family projects, which are under the umbrella of SLICES-RI. The different projects of the family will all have a similar and unique visual identity.

Figure 4: SLICES-SC logo

Figure 5: SLICES logo

3.2. 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 will be used both as a communication and dissemination channel. Indeed, it will assist in raising public awareness and ensuring maximum visibility of the project vision, objectives, work plan, documents, infrastructure and dissemination materials, not only within the scientific community but also to a larger.

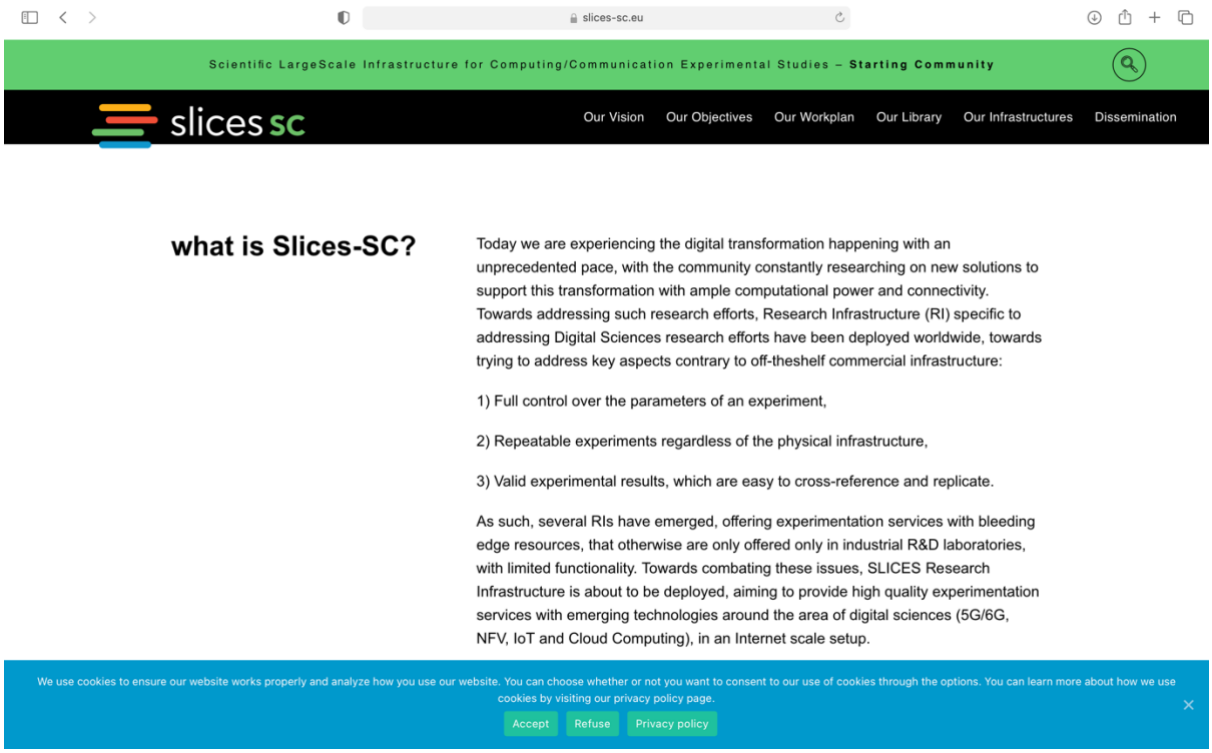


Figure 6: SLICES-SC website - 1

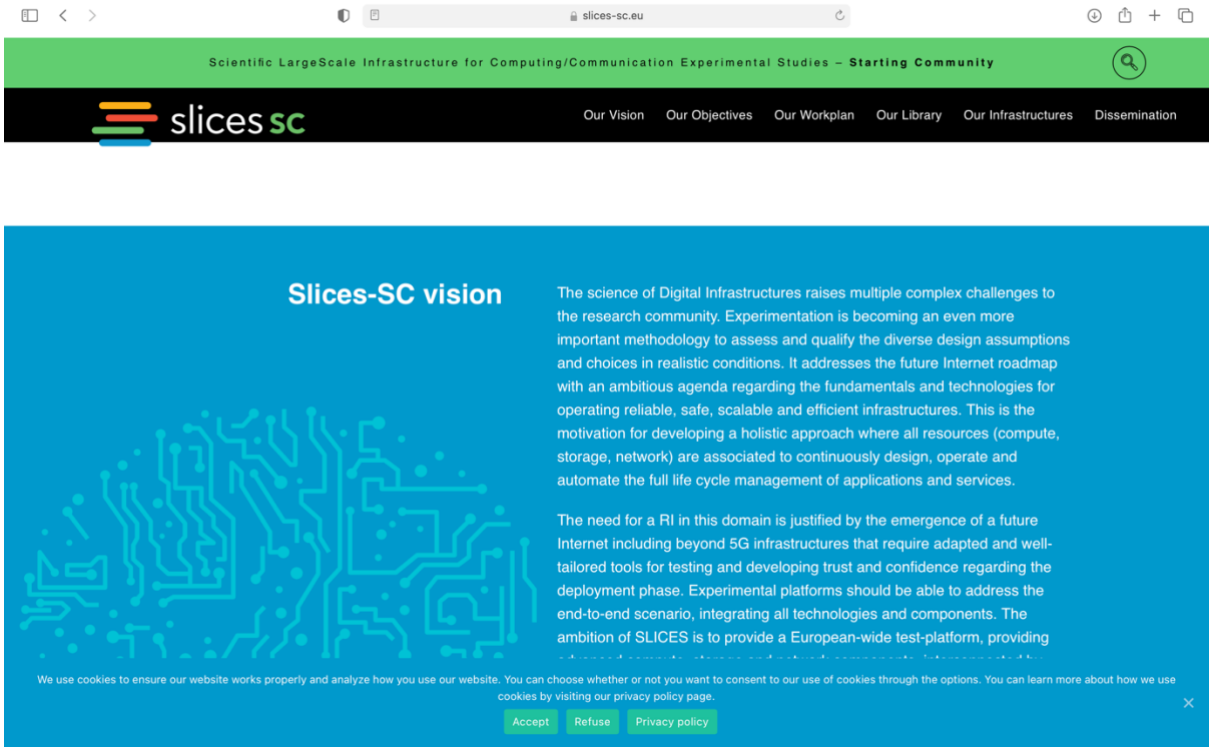


Figure 7: SLICES-SC website - 2

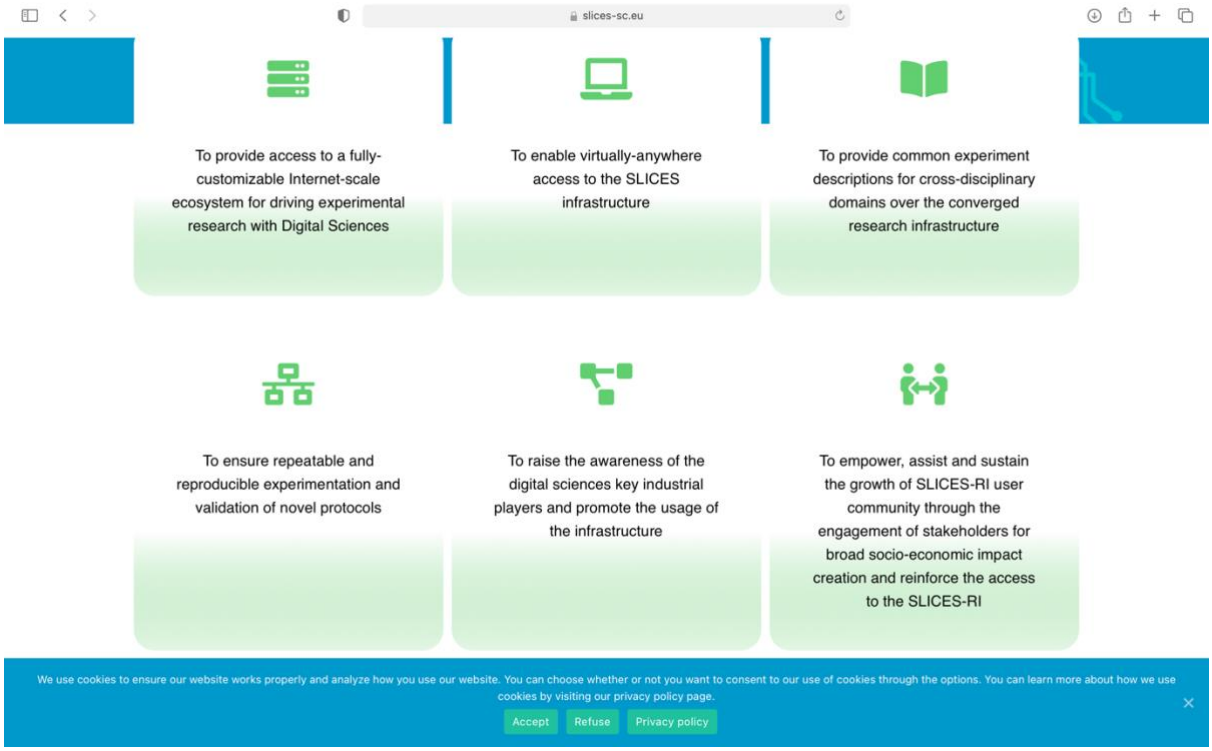


Figure 8: SLICES-SC website - 3

The website's purpose is to serve as the central source of information of SLICES-SC, providing insights on its activities, news, and developments. It will target all stakeholders to raise awareness and foster engagement, and will be promoted on social media as well as in digital and hard copy promotional materials and publications.

The initial structure of the SLICES-SC website is depicted in the figure below:

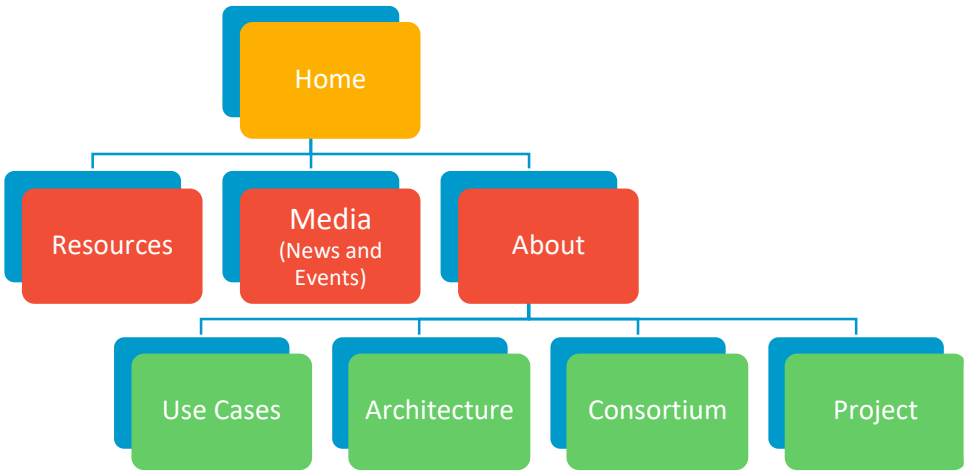


Figure 9: SLICES-SC website structure

The website will be maintained throughout the SLICES-SC cycle until M36, and at least during the five years after the project end. It will also be linked to the SLICES-RI website. At the initial stage, the website provides static content and some news articles and events. Based on the progress of SLICES-SC, the website will be updated and enhanced accordingly.

3.3. User forum

Under task 6.2, SLICES-SC has developed a 'User Forum' – a collaborative website for the SLICES community of experts. The portal seeks to use the access to information and to the various resources and installations made available through the SLICES-RI research infrastructure. The User Forum (which is currently not public, but will be accessible at http://slices-forum.eu) is hosted and managed IoTLab, with the support of the SLICES-SC partners for moderation, as necessary. It will be directly accessible from the SLICES-SC website. The User Forum is using WordPress as Content Management System (CMS). User Forum members will be invited to project workshops and events, get early information on project developments, and will be requested annually to provide feedback to SLICES-SC for continuous improvement. The User Forum will be collectively supported by all members of the consortium. Interested members will be invited to register to the User Forum and will obtain access to the dashboard including information about events, publications, presentations and SLICES updates. Through the User Forum, the SLICES-SC partners will also provide help and support to the research community for the technical questions linked to the SLICES research infrastructure.

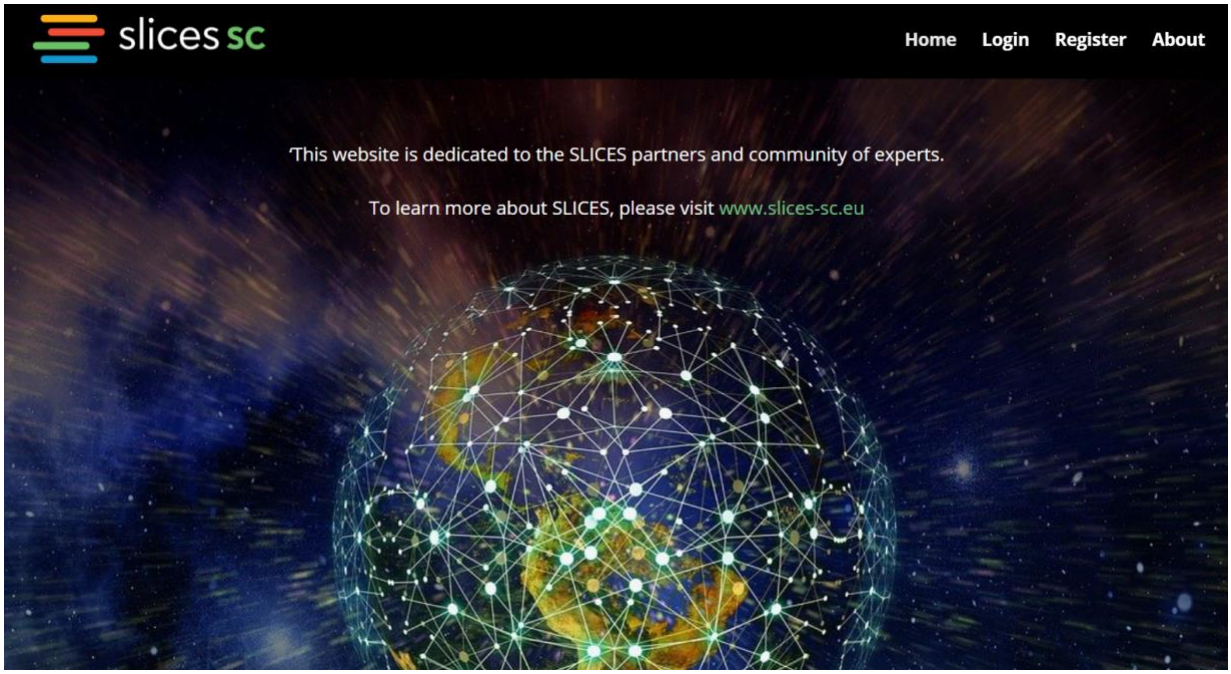


Figure 10: User Forum webpage

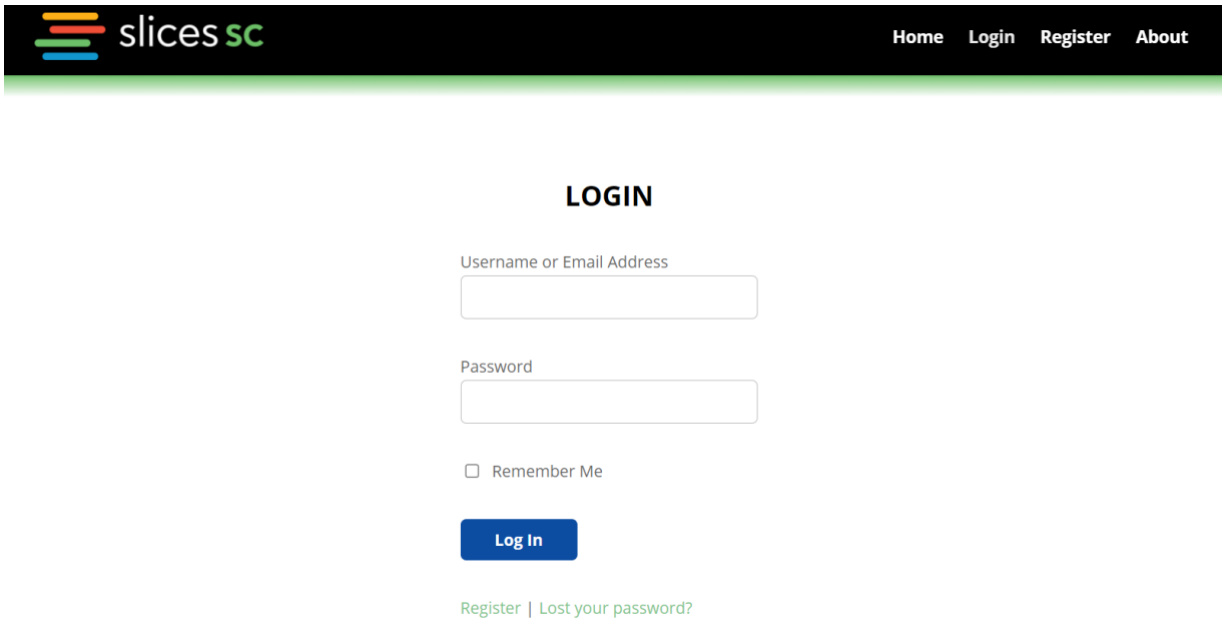


Figure 11: User Forum login page

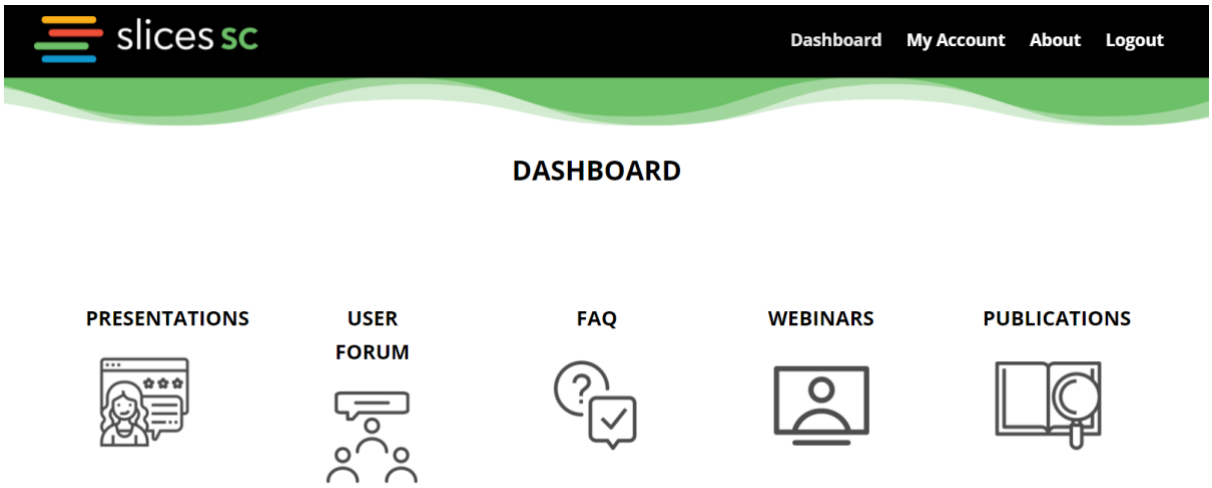


Figure 12: User forum dashboard

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 with 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.

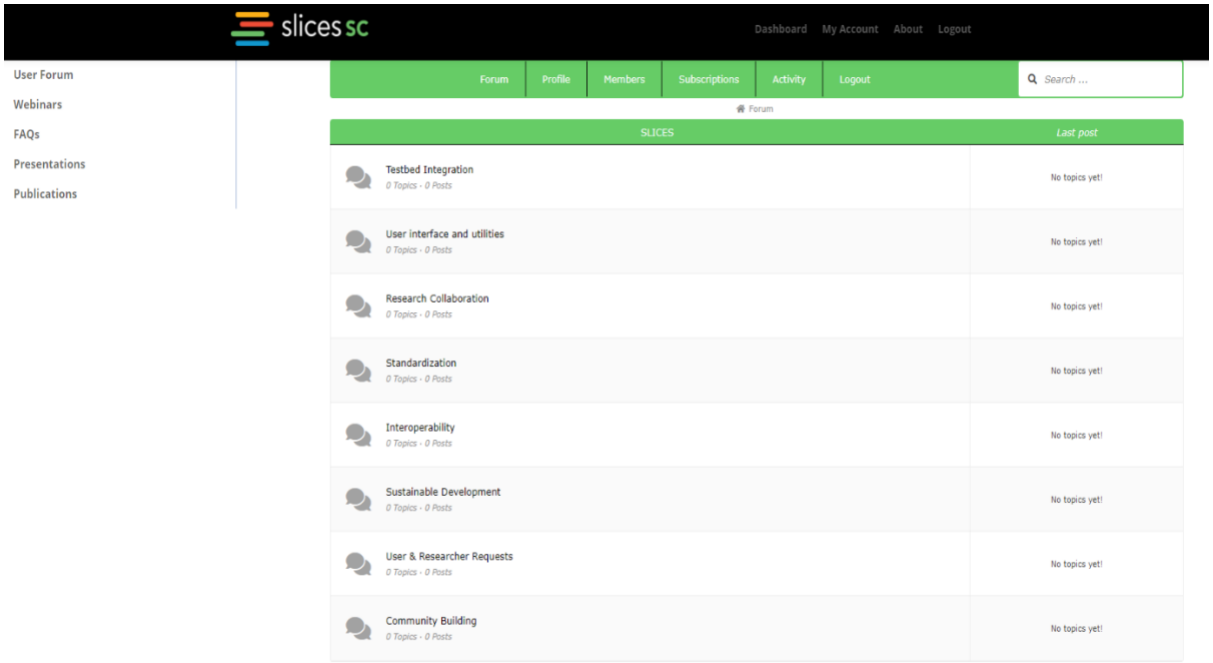


Figure 13: User Forum discussion threads

3.4. Promotional material

Brochures/flyers will be small booklets that will be made in line with the SLICES-SC visual identity. They will provide general information about SLICES-SC, including issues it aims to address and solutions it offers. In addition, they aim to provide information to target groups participating in offline events (meetings, workshops, conferences).

3.4.1. Poster

Posters are communication tools that are mainly used in events organised by the project or at external conferences, symposia, workshops, seminars or others in relevant domains. The poster has been prepared in English (local languages to be considered if appropriate or necessary) to raise the interest of the stakeholders and of a variety of relevant audiences. It offers insights into the project with concise textual and graphical information. Two distinctive layouts have been proposed for SLICES-SC. The layouts of the posters are depicted in the following figures.

Figure 14: SLICES-SC poster – version 1

Figure 15: SLICES-SC poster – version 2

3.4.2. Leaflet

Leaflets are a convenient way of communicating to different audiences about the objectives, development or findings of the project. Leaflets will be editable and printable by any of the project partners, and therefore, will be tailorable both in terms of content and language. The layout of the leaflet is depicted in the following figure.

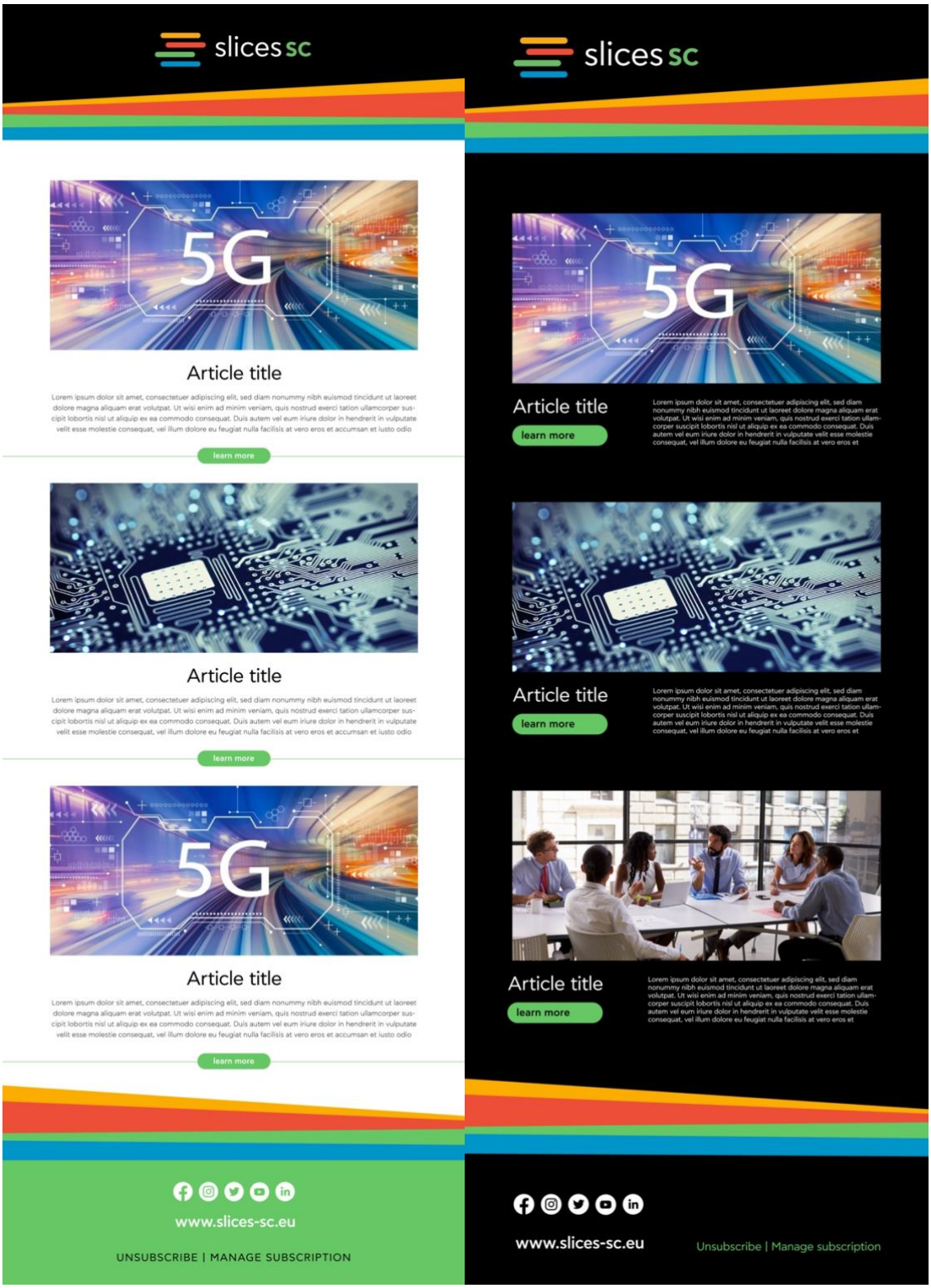


Figure 16: SLICES-SC leaflet

3.5. 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 will be used: Twitter, YouTube and LinkedIn. In order to reach the wider possible audience, it has been decided to use the same account as the SLICES-RI's one.

- Twitter[1]: project-related news and relevant articles from other sources supporting Digital Research Infrastructures will be tweeted. The target groups will be researchers, the general public, scientific and academic personnel, businesses, NGOs technological developers, policymakers, funding authorities, etc.

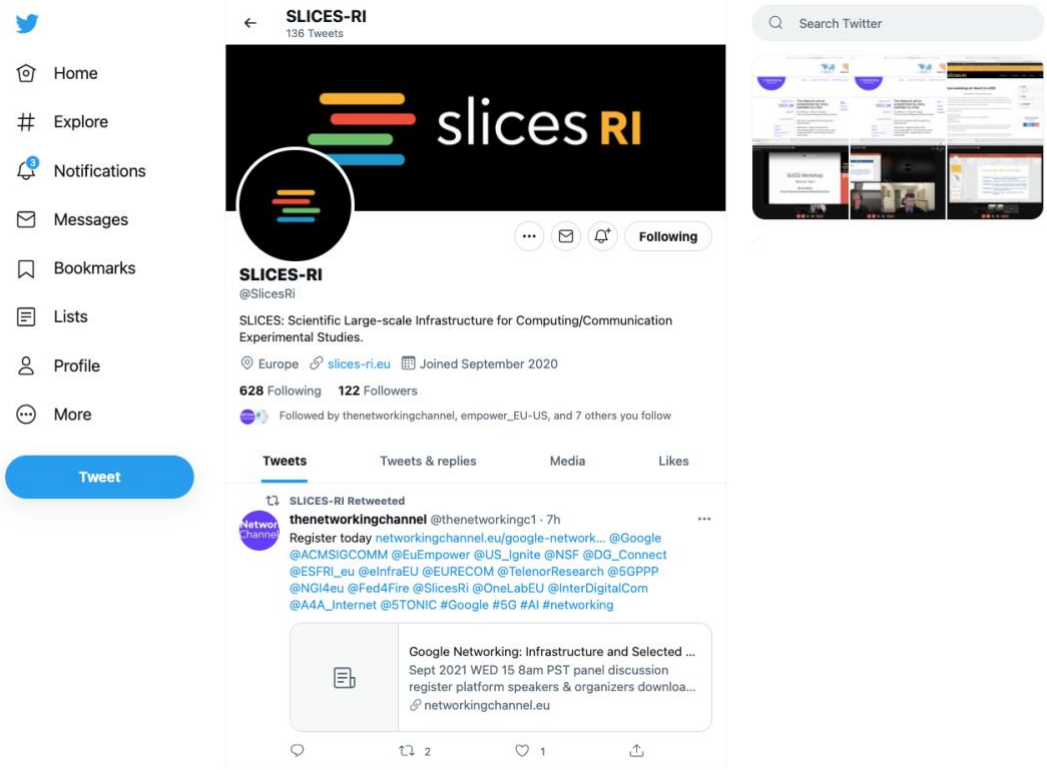


Figure 17: SLICES-RI Twitter account

- YouTube[2]: promotional videos and "Success Stories" to be linked to the website and Twitter. The frequency will depend on the availability of the videos. The target groups will be researchers, the general public, scientific and academic personnel, businesses, NGOs technological developers, policymakers, funding authorities, etc.

[1] Accessible at: https://twitter.com/SLICESRI [Last accessed 14 September 2021].
[2] Accessible at: https://www.youtube.com/channel/UCKM15y2D8rRYAnUDjpLsHug/featured [Last accessed 14 September 2021].

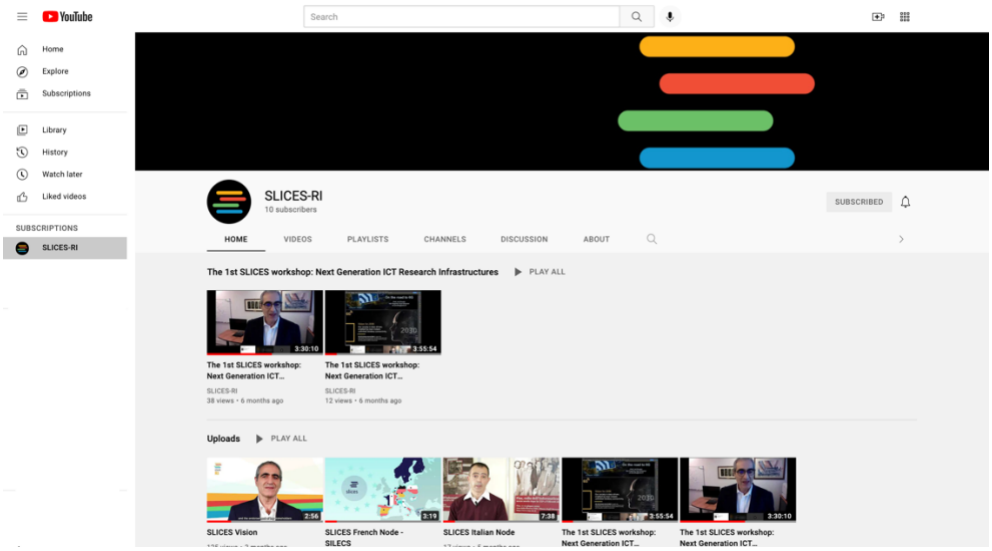


Figure 18: SLICES-RI Youtube account

- **LinkedIn:**[3] project-related news and relevant articles from other sources supporting Digital Research Infrastructures will be posted. The target groups will be researchers, the general public, scientific and academic personnel, businesses, NGOs technological developers, policymakers, funding authorities, etc.

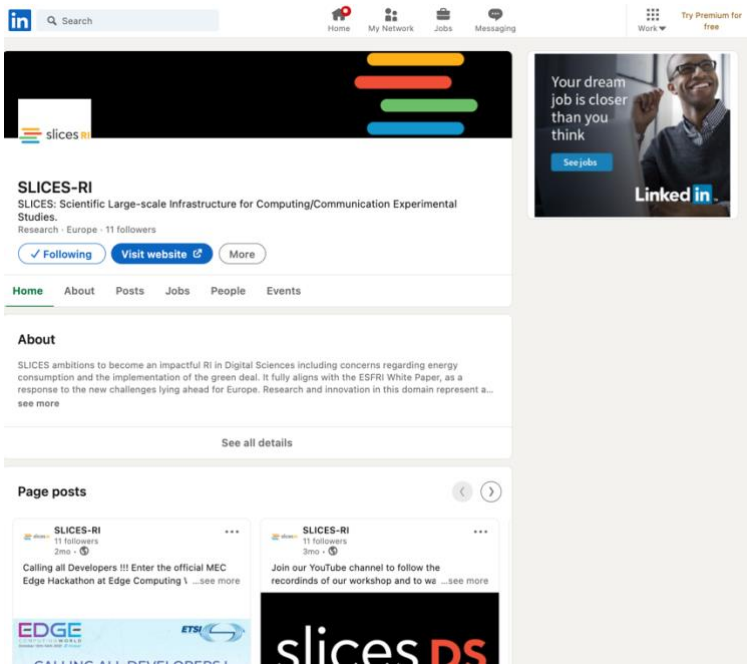


Figure 19: SLICES-RI LinkedIn account

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

3.6. 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. When deciding on a journal and/or a conference for the publication of ideas and results, SLICES-SC will take into consideration reputation and quality as well as offered open access options. A dedicated section of the SLICES-SC website will reference all consortium publications and provide access when publications are available. In case of copyrighted material, the website will provide access to the accepted versions of these papers and not to the published ones, together with a link to the official versions.
Below, a list of leading scientific journals with a scope relevant for SLICES-SC can be found:

- IEEE Transactions on Mobile Computing (TMC)
- IEEE Transactions on Parallel and Distributed Computing
- IEEE Transactions on Cloud Computing
- Mobile Networks and Applications
- IEEE Internet Computing
- IEEE Wireless Communications
- IEEE Network
- IEEE Pervasive Computing
- Computer Communications
- EURASIP Journal on Wireless Communications and Networking
- Journal of Parallel and Distributed Computing
- Elsevier Computer Networks.
- Elsevier Future Generation Computer Systems

3.7. Events

3.7.1. Project events

In order to raise the awareness and the engagement of the community of researchers around Digital Sciences, it is important to foster the use of existing infrastructure by wider audiences than the technical elite in the computer science discipline. SLICES-SC will thus propose ready-to-deploy experiments, allowing even novice users to take advantage of the infrastructure (WP2). Moreover, by establishing an open data server for sharing experimental results, benchmarks on the existing and future experiments over the infrastructure will be provided to the community, allowing the reproducibility of results and a standard reference for validating research outcomes (WP3).

In the context of SLICES-SC Networking activities, Task 6.4 will organise two types of events to publish the above to a broader audience: dedicated project events and participation in third parties' major 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 list of 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). Tentative dates (to be confirmed with the partners): M12, M16, M20, M24, M30 and M34.
- 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.
- **Two 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. Considered summer schools themes include: Advanced Radio, IoT to Cloud, Open Data and Reproducibility, Connected Industry, and Time Sensitive Networks. The selection of the topics and places will be done by M12.
- **Three hackathons** on selected themes of Digital Sciences. Tentative dates M12, M18 and M24. Potential topics include: 5G innovative services, IoT Security and MEC Performance.

A list of the selected topics, organisers and confirmed dates for all the above events will be established by M12.

3.7.2. Third-party events

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

Table 3: List of third parties' events

Name	Description	Link	Date
IOT WEEK	IoT Week	https://iotweek.org/	30 Aug – 3 Sep 2021
GLOBECOM	IEEE Global Communications Conference	https://globecom2021.ieee-globecom.org/	Dec 2021, 2022/23
INFOCOM	IEEE International Conference on Computer Communications	https://infocom2022.ieee-infocom.org/	May 2022 and 2023
PIMRC	IEEE International Symposium on Personal, Indoor and Mobile Radio Communications	https://pimrc2021.ieee-pimrc.org/	Sep 2021 and 2022
IEEE 5G World Forum	5G Forum	https://ieee-wf-5g.org/	13-15 Oct 2021
EuCNC	European Conference on Networks and Communications	https://www.eucnc.eu/	2022
WCNC	IEEE Wireless Communications and	https://wcnc2022.ieee-wcnc.org/	April 2022, and 2023

	Networking Conference		
Cloudnet	IEEE International Conference on Cloud Networking	https://cloudnet2021.ieee-cloudnet.org/	Nov 2021 and 2022
MWC	Mobile World Congress	https://www.mwcbarcelona.com/	Feb-Mar 2022
BBWF	Knect365 Broadband World Forum	https://tmt.knect365.com/bbwf/	Oct 2021 and 2022
	Knect365 The Edge Event	https://tmt.knect365.com/the-edge-event/	Nov 2021 and 2022
	Knect365 5G World Event	https://tmt.knect365.com/5gworldevent/	Sep 2021 and 2022
	Open Network & Edge Summit	https://events.linuxfoundation.org/open-networking-edge-summit-north-america/	Oct 2021 and 2022
Upperside Conferences	MPLS SD & AI Net World Congress	https://www.uppersideconferences.com/mpls-sdn-nfv/	April 2022
TMforum	Digital Transformation World Series	https://www.tmforum.org/	Sep-Oct 2021
WGC	Wireless Global Congress hosted by Wireless Broadband Alliance	https://www.wirelessglobalcongress.com/	Sep-Oct 2021 and 2022
CCW	TCCA Critical Communications World	https://critical-communications-world.com/	Nov 2021 and 2022

A list of topics and participating partners to the above external events will be established by M12.

4. Academic outreach and academic exploitation

Education in recent years has slowly transitioned to an online model, allowing access to a massive amount 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. In this section, the case of the NITOS testbed is analysed, the Greek SLICES node, located in the University of Thessaly, Volos, Greece. It is detailed how the experimentation resources have been training more than 500 participants in networking courses over the 2020-2021 academic year.

4.1. Node configuration for provisioning Networking Labs

The target facility used for the development, application and evaluation of the hands-on experiments for the networking courses is the NITOS testbed (http://nitos.inf.uth.gr), located in the University of Thessaly, Greece. The testbed is providing in a 24/7 fashion remotely accessible resources, targeting experimentally driven research in wireless and wired networks. In this section, a very brief description of the capabilities and related frameworks that ease the deployment of the relevant labs for the students on the testbed is presented.

The testbed is providing access free-of-charge to over 100 static physical nodes, equipped with key networking technologies for wireless networking research (WiFi with open-source drivers, off-the-shelf 4G networks, Software Defined Networks for 5G and beyond networks, mmWave and IoT technologies), wired Software Defined Networking and Cloud resources. The testbed offers a number of different tools for experimenting with the infrastructure. These tools rely on a scheduler interface, through which the experimenters can book the testbed nodes for a predefined timeframe and get bare metal access on the nodes. However, for the needs of quickly deploying experiments that can be used by a large mass of users (e.g. up to 400 students participating in a single course), the access scheme is changed, and provisioning of the lab materials takes place through a different set of tools. The target labs have been developed in a cloud-native manner (using docker containers) in order to allow their massive deployment and usage by the students.

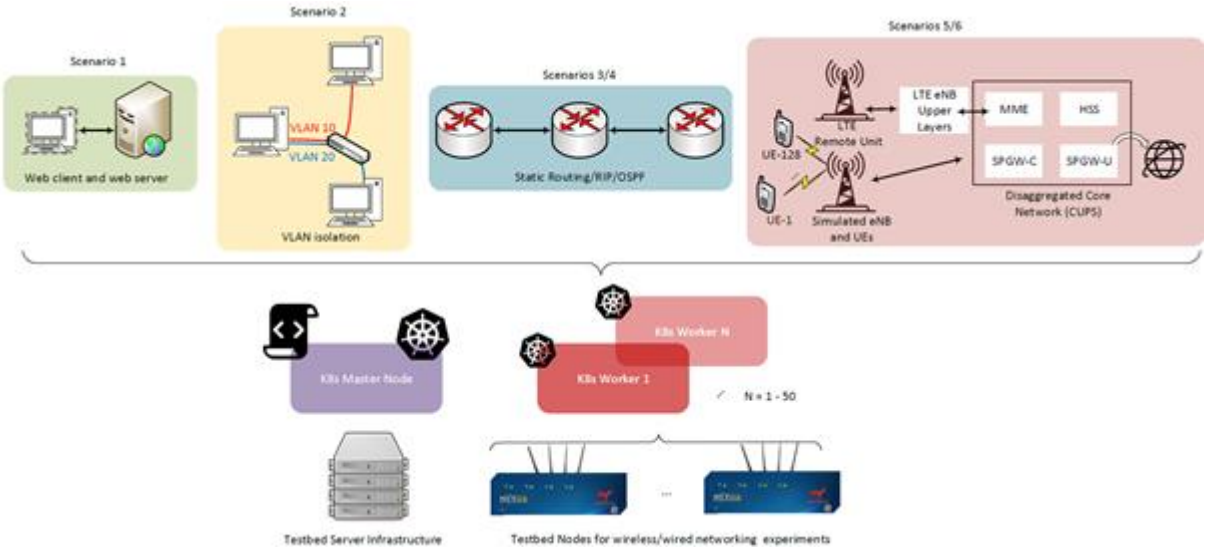


Figure 20: Testbed configuration for running the networking lab scenarios

4.2. Lab development and deployment

The developed labs are used in a number of different computer networking courses, either introductory to networking concepts or more advanced regarding wireless network operation. The labs have been developed in six different scenarios, around the four topics outlined below and illustrated in the Figure above.

Web-services

In this lab, students delve into the basics of a web transaction and learn about the client-server model. The students get access to a pair of containers, one of which is running an NGINX web server and a second one used as the web client. By using tools provided in the container (*wget, curl, Chromium browser*), they send requests to the webserver and observe the responses. Second, they implement a web client using TCP/IP sockets and retrieve the served webpage through their own client. Delving into the specifics of the HTTP protocol, the students use the *tcpdump*tool to observe how the HTTP protocol is expressed in the packet level and the network exchange.

Flow Isolation

In this lab, the students learn how different flows in the network can be isolated from each other by using the VLAN technology. Each student gets access to three containers (e.g. A, B, C), which are configured to communicate over different VLANs. For example, container A is communicating with container B over VLAN-X, and with container C over VLAN-Y. In such a setup, traffic transmitted from container B is not captured at any of the container C network interfaces. Using simple traffic generators (e.g. *ping* command) and the network capture *tcpdump* tool, the students generate traffic and see how the VLAN configuration enforces the isolation of traffic flows in the network.

Network Routing

This lab is dedicated to routing networking packets. The lab is divided into two different scenarios as follows. In the first scenario, the students get access to three containers, which are configured to use two different networks. One of the containers has access to both networks and can act as a router. The goal of the lab is for the students to experiment with the *ip route*commands and configure the routing rules that will enable all the different containers to communicate with each other. In the

second scenario, the deployed containers launch the *Quagga*software, which allows the execution of a networking protocol (e.g. RIP/OSPF/BGP) over the different containers. Using network capture tools such as *tcpdump* and *Wireshark*, the students observe the specific message exchanges for each protocol between the different containers, complementing the knowledge they get through the theory sessions of the course.

Cloud-native Radio Access Network

This lab is oriented for courses dealing with wireless networking, demonstrating how network softwarisation enables the on-the-fly instantiation of entire cells in a mobile broadband networking scenario. Through the lab, the students are provided with a larger number of containers as follows: 1) a set of four containers, configured to run a disaggregated instance of an Evolved Packet Core (EPC) Network for a 4G networking cell - the EPC is configured to run with the latest feature of Control and User Plane Separation (CUPS) of the 4G Architecture, 2) one container running the upper part of a disaggregated base station (Cloud-RAN), using a Software Defined Radio (SDR) frontend for transmitting data over the air, 3) one container running a simulation environment for a base station and up to 128 users attaching to it. All the containers are based on software from the OpenAirInterface (OAI) platform. The students run two different scenarios: 1) using the EPC containers and the base station setup, which enables them to observe the cell transmitting over the air using spectrum sensing tools, or 2) using the EPC containers and the simulator container, where they get to attach a number of different users and observe the signalling exchanged from the user to the base station and subsequently to the EPC, for admitting a user to the network. This lab takes place in either computer networking introductory courses to demonstrate an all-software based network, or in more advanced networking lessons where the users learn the basics of operation for the 4G wireless network.

It is currently further extended in order to teach different aspects of signalling in cellular networks, as well as different interfaces, GPRS tunnels, etc.

4.3. Lab evaluation

For each of the developed labs, a different number of hosting nodes is needed. For instance, the first three labs do not exceed the limits of resources per each NITOS node and are restricted only by the framework that allows only up to 100 dockers per compute node to be instantiated. On the other hand, the more advanced labs on cloud-native RANs can host up to two labs on each node, with some limitations (e.g. reducing the number of UEs attaching to the network).

The first set of labs are more applicable to introductory networking courses, which have a massive number of students attending, approx. 350 students/year. For such courses, the current setup allows the configuration of the hands-on labs with less than 15 physical nodes in total. The more advanced labs on cloud-native RANs are instructed in the more advanced networking courses, which are not mandatory courses, and therefore have a smaller number of students (approx. 50 per year). This allows the execution of the labs with less than 25 physical nodes, which is exactly half of the offered resources in the NITOS testbed. Based on the current offering of testbed resources, we conclude that the testbed can be used for serving concurrently up to 2500 students for the first types of experiments and up to 100 for the more advanced ones.

Through the framework contributions developed by the testbed team, the labs can be deployed in a single-click manner, regardless of the number of students that participate in the courses, thus relieving the overhead in preparing the labs from the instructors. The proposed framework can help towards bridging the gaps between traditional lecturing and hands-on training for future network engineers. As more courses are taught online, the training aspect of the teaching process might be under-developed since the norm is that the students do not have access to costly equipment. On the other

hand, frameworks such the aforementioned one can help towards providing training resources from available testbeds that are equipped with cutting-edge equipment and integrate them in the learning process. Such hands-on training can help towards materialising the knowledge from lecture/online taught courses and possibly integrate them within a MOOC platform; this will enable the execution of repeatable and reproducible experimental results in real-time through the platform. Such an effort is currently in progress for the aforementioned courses (http://web.nitlab.inf.uth.gr/advanced_topics/).

5. 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. This deliverable 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 section 6;
2. The deliverable describes the assets of the project to be considered for the standardisation process in section 7;
3. The relevant Standards Developing Organisations (SDOs) where the project needs to collaborate with are presented in section 8;
4. Section 9 of this document lists all the lead partners contributing to the standardisation activities in the SLICES-SC;
5. The synthetic strategy for the standardisation is presented in section 10;
6. The proposed timeline for the standardisation activities to be conducted in the project is proposed in section 11 of this deliverable;
7. Finally, a conclusion closes the standardisation chapter.

The identification of the standardisation assets is realised through a survey distributed to the project partners. Then, the results of the survey are analysed along with this deliverable. The process concerning the survey is described in the following section.

5.1. Internal survey and review of the SLICES-SC potential for standardisation

A survey was elaborated and distributed to all the partners to identify the assets and topics to be standardised in the context of the SLICES-SC project. The survey is following the principle of the three Ws questions:

- WHAT topic has the potential to be submitted to standardisation?
- WHERE (which SDOs and for a) will be most relevant and deliver the best impact?
- WHO can lead and support the standardisation effort in the project?

The survey is available in the first annexe of this deliverable.

The introductory part of the survey is collecting the contact information of the respondent.

Part A of the survey concerns the partner's perspective, in detail the expected results of SLICES-SC exploitable by the partner and the value proposition of the SLICES-SC results.

Part B permits to know the standardisation activities performed by a partner, the standardisation process to be followed in the SLICES-SC project, the assets to be standardised, the SDOs where the standardisation should be undertaken. Other questions of this part encompass the membership of the partner in an SDO, the possibility to make joint contributions and the contact information of employees inside the partner's organisation who are responsible for the standardisation activities.

As the SLICES-SC is at an early stage, not all the research results that can be standardised in the project are identified, but already some actions to be done in the standardisation activities are planned.

5.2. Target standardisation outcomes and KPIs

To monitor the progress of the standardisation activities realised in the SLICES-SC project, some Key Performance Indicators (KPIs) were defined:

Table 4: KPIs for standardisation

KPI	Target
Number of contributions to SDOs	5
Percentage of joint contributions	50%
Percentage of identified innovations brought to standardisation succeeding to be taken into account in draft standards	50%

The contributions to the different SDOs mentioned in this document include not only the new draft recommendations or contributions to existing standards but also other types of collaborations with SDOs like presentations, participation to events organised by the SDOs, etc.

6. Relevant EU frameworks for SLICES-SC Standardization

The section presents the priorities in terms of standardisation in Europe for the domain of large-scale research infrastructures. This section will permit a better alignment of the standardisation made in the context of the SLICES-SC project with the European priorities.

6.1. EU Rolling Plan for ICT Standardisation and EU priorities for large-scale infrastructure

The Rolling Plan for ICT Standardisation[4] allows linking the European policies and the standardisation activities. One of the main topics of the current version of the Rolling Plan for ICT Standardisation is the e-Infrastructures for research data and computing-intensive science[5]. The computing infrastructures and the research data are playing a big role in the digitalisation in science. In fact, each field of science is concerned by digitalisation which permits to increase collaborations at the international level slightly. Enormous amounts of data will be produced soon in different research domains. To support this increase of data, the current European research infrastructures should be modernised; this work has already started through the ESFRI roadmap. The SLICES research infrastructure is now fully integrated into the ESFRI roadmap, and it will be a very important tool to improve innovation and scientific progress in the ICT domain. Other related initiatives are supported at the European level, namely EOSC (European Open Science Cloud) and EDI (European Data Infrastructure). EOSC is a virtual environment to store and process large volumes of data. EDI is provided with the high-bandwidth networks and the supercomputing capacity to access and process the data stored in the EOSC cloud. Of course, the SLICES research infrastructure will collaborate in the context of the project with these two important European initiatives.

The Rolling Plan for ICT Standardisation mentions in terms of standardisation activities the following SDOs:

- Research Data Alliance (RDA): Formally, RDA is not an SDO but rather a mechanism to accelerate the adoption of standards linked to research data and computing infrastructures. Some technical specifications are provided by RDA. Research Data Alliance is collaborating with other organisations in the context of standardisation, such as IETF, W3C and ICSU/CODATA (International Council for Science/Committee on Data);
- At the global level, ITU-T is playing an essential role. Different Study Groups are concerned by the standardisation associated with research infrastructures. The following Study Groups are identified in the Rolling Plan for ICT Standardisation:
    - SG11: “Signalling requirements, protocols, test specifications and combating counterfeit products”;
    - SG13: “Future networks, with focus on IMT-2020, cloud computing and trusted network infrastructures”;
    - SG20: “Internet of Things (IoT) and smart cities and communities (SC&C)”.

The European Commission is encouraging the Horizon 2020 projects related to research infrastructures to contribute to the standardisation.

[4] European Commission, Rolling Plan for ICT Standardisation: https://joinup.ec.europa.eu/collection/rolling-plan-ict-standardisation/rolling-plan-2020, [Last accessed 14 September 2021].
[5] European Commission, E-Infrastructures for research data and computing intensive science: https://joinup.ec.europa.eu/collection/rolling-plan-ict-standardisation/e-infrastructures-research-data-and-computing-intensive-science, [Last accessed 14 September 2021].

7. SLICES-SC identified assets for standardisation (WHAT)

This section presents the results of the survey about the topics and assets to be considered in the standardisation process in the SLICES-SC project.

7.1. Identified topics by the partners to be considered for standardisation

The topics proposed by the different partners are listed below:

- Testbed federation;
- Testbed monitoring and management;
- Open APIs;
- Architecture;
- Network interconnectivity between testbeds;
- Experiment setup;
- Infrastructure/Experiment monitoring;
- Testbed interconnection;
- Protocols used for the end-to-end integration of the infrastructure.

7.2. Description of identified assets to be considered for standardisation

The list above was analysed, and different categories were made accordingly:

1. Architecture of the distributed RI;
2. Nodes/Network interconnection;
3. Interoperability and integration;
4. Testbed/Infrastructure monitoring and management;
5. Experiment setup and monitoring.

A description of each category is given in this section.

7.2.1. Architecture of the distributed RI

The SLICES research infrastructure is seeking a reference architecture able to handle correctly all the components installed in several geographically distributed nodes. Different options of the reference architecture are attentively studied, either from distributed RIs or from testbed federations or any other structures with distributed components, and the pros and cons of each option are analysed. The results will permit to elaborate a reference architecture which will be at the end implemented in the SLICES research infrastructure. The resulting architecture is considered by several partners as an important asset to be standardised.

7.2.2. Nodes/Network interconnection

The interconnection between the nodes at the network level is also a topic with the potential to be standardised in the context of the SLICES-SC project. Indeed, the interconnection at the network level permits to link the nodes in a horizontal way. It means that a horizontal distributed RI can be built more efficiently with the use of automated mechanisms at the network level. Typical examples of such automation include the testbed discovery, the publication of the testbed capabilities in a universal broker. Currently, there is a lack of such automation mechanisms in the standards concerning the nodes/testbed interconnection.

7.2.3. Interoperability and integration

Interoperability and integration are very important in the context of research infrastructures based on distributed nodes or also in the context of federated testbeds. Good interoperability between all the components provided by the different stakeholders of the SLICES research infrastructure will allow more possibilities of interactions and collaborations between the applications and services of SLICES. A reduction of time of development is also expected if the interoperability is fulfilled. To achieve efficient interoperability, standardised protocols and Open APIs are the key elements. Of course, a study of the state-of-art should be undertaken during the SLICES-SC project to determine the protocols and Open APIs to be used. If there will be a lack of satisfying protocols or Open APIs, the project can propose new ones or update current incomplete standards.

7.2.4. Testbed/Infrastructure monitoring and management

The monitoring and the management of the infrastructure and the related testbeds are considered as an asset to be standardised. The improvement of the current solutions employed for the infrastructure and the testbeds monitoring and management can lead to an update of standards on this topic, or eventually, to the creation of new draft recommendations. The standardisation of the monitoring and management will allow uniformising the tools and mechanisms to monitor and manage the research infrastructures. In the end, the management and the monitoring will be made more efficient and easier for the infrastructure and testbed providers.

7.2.5. Experiment setup and monitoring

The partners would like to facilitate the setup and the monitoring of experiments realised in their current testbeds. In this context, new methods or mechanisms to quickly build an experiment are welcome, and they can be taken into account as assets to be standardised in the SDOs mentioned in this deliverable.

7.3. Summary of identified assets to be considered for standardisation

The following table presents a summary of assets potentially standardisable in the SLICES-SC project:

Table 5: Identified assets for standardisation

Standardisation assets	Description
Architecture of the distributed RI	Architecture: The reference architecture of the SLICES research infrastructure. Testbed federation: The methods used to federate the testbeds.
Nodes/Network interconnection	Network interconnectivity between testbeds: The technologies and mechanisms to interconnect the testbeds and other components at the network level. Testbed interconnection: The automated mechanisms needed to ensure the basic functionalities related to the testbed interconnection such as the discovery and the listing of testbed or infrastructure capabilities.
Interoperability and integration	Open APIs: APIs allowing the interoperability between the software components of the research infrastructure.

	Protocols: Used for the end-to-end integration of the elements of the research infrastructure in an interoperable manner.
Testbed/Infrastructure monitoring and management	Testbed monitoring and management: New methods to manage and monitor a testbed efficiently for a testbed provider in function of the needs of the researchers. Infrastructure monitoring: Methods or tools permitting to monitor and manage a research infrastructure in the function of the available hardware and software.
Experiment setup and monitoring	Experiment setup: Possible new tools or automated mechanisms to build experiments in a user-friendly way. Experiment monitoring: Tools that should facilitate the efficient monitoring of ongoing experiments and detect defective experiments.

8. SLICES-SC identified SDOs for standardisation (WHERE)

8.1. SDOs and fora identified by the partners for SLICES-SC standardisation

The survey has asked the partners for possible SDOs where the standardisation activities can be undertaken in the SLICES-SC project. The complete list is given below:

- 5G-PPP
- ETSI
- IEEE
- ITU
- NIST

8.2. Detailed overview of relevant SDOs and for SLICES-SC standardisation

8.2.1. 5G Infrastructure Public-Private Partnership (5G-PPP)

The 5G Infrastructure Public-Private Partnership (5G-PPP) is a European initiative grouping the European Commission and the European ICT industry composed of the manufacturers, the telecommunications operators, the service providers, SMEs and the research centres. The deliverables of 5G-PPP could be standards, architectures, technologies or solutions in the context of 5G.

The SLICES-SC consortium could consider and investigate the capability of participating in 5G-PPP, which has established several working groups under its 5G-TB (5G Technology Board) activities. The work of these working groups is organised through regular conference calls, a target is set, and at the end, the work is published on a regular basis through white papers. For example, one of the 5G-TB working groups that SLICES-SC can contribute is the Test, Measurement and KPIs Validation one. Even though this activity cannot be considered strictly as a standardisation activity, many of these results can contribute to various SDOs. In addition, the participation of SLICES-SC in 5G-PPP will significantly enhance the project visibility and its liaison with the industry.

The Software Networks Working Group is also lead and managed by 5G-PPP: https://5g-ppp.eu/5g-ppp-work-groups/. This working group is addressing the applicability and the unification of research topics associated with Software Networking. Such topics concern the infrastructures, the systems and the components used for wired and wireless networks, clouds, Internet of Things and services. Of course, the Software Defined Networks (SDN) and Network Function Virtualisation (NFV) are including in this area of research.

8.2.2. European Telecommunications Standards Institute (ETSI)

The European Telecommunications Standards Institute (ETSI) is an independent Standards Development Organisation (SDO) based in Europe and dedicated to the ICT domain. ETSI is developing, ratifying and testing global standards which are used by the industry and the society.

ETSI has a Technical Committee (TC) Core Network and Interoperability Testing (INT): https://www.etsi.org/committee/int. This Technical Committee is in charge to develop test specifications for conformance, interoperability, performance and security in the context of fixed and mobile networks. It provides test purposes, test descriptions and test cases for all the components of the core network. The related work encompasses SDN, NFV and E2E orchestration.

ETSI Industry Specification Group (ISG) on IPv6 Enhanced Innovation (IPE) could also be a good candidate to undertake some standardisation activities linked to the interconnection of testbeds: https://www.etsi.org/committee/1424-ipe. Indeed, this group is taking care of the IPv6 networking

technology which can be potentially used during the interconnection of the SLICES testbeds. The aim of this group is to facilitate the deployment of IPv6 in different domains using defined requirements and architectures. Proofs of concept and demonstrations of use cases are also done in this group to validate the new solutions brought by IPv6. ETSI ISG IPE is also a facilitator to the transition from the old IPv4 protocol to the IPv6 protocol by providing best practices. The work done is a complement to the activities undertaken by other SDOs.

8.2.3. Institute of Electrical and Electronics Engineers (IEEE)

IEEE is a professional association for engineers involved in electronics and electricity based in New York. IEEE is one of the main SDOs and produces the standards through different initiatives and projects.

In the context of the activities undertaken by IEEE, the Future Networks Initiative (FNI) Testbeds Working Group (WG) is very interesting because it collaborates with the vendor community and research community to expand upon the existing testbeds towards federated development of testbeds for next-generation networks: https://futurenetworks.ieee.org/testbeds. The goal of this Working Group is to prepare the industry for the 5G and beyond networks through experiments done in cutting-edge testbeds managed by academic and industrial research groups. The Working Group is handling a repository containing the testbeds and their heterogeneous resources. One objective of the Working Group is to increase and ease the collaboration between the testbed users and the developers. This community of researchers intends to address the issues met in 5G and beyond testbeds.

IEEE is also managing the project P2302 “Standard for Intercloud Interoperability and Federation (SIIF)”: https://standards.ieee.org/project/2302.html. The project is defining a functional model for federation based on the reference architecture for cloud federation written by NIST. This model can be used in several application domains, allowing interoperability in the cloud dimension.

8.2.4. International Telecommunication Union (ITU)

ITU is the United Nations agency dedicated to information and communication technologies. The international standards are developed as ITU-T Recommendations by Study Groups. Each Study Group has a specific domain of competence and related topics of interest.

ITU-T has several Study Groups (SGs) which are concerned by the topics or assets to be standardised in the SLICES-SC project:

- SG11 “Signalling requirements, protocols, test specifications and combating counterfeit products”: https://www.itu.int/en/ITU-T/studygroups/2017-2020/11/Pages/default.aspx. Test specifications are elaborated in this Study Group to ensure global interoperability in numerous domains like the next-generation networks (NGN), ubiquitous sensor networks (USN) and Internet of Things (IoT). In particular, protocols and test specifications are the topics that are the most linked to the project activities. The corresponding working party is WP3/11, and the dedicated question is Q16/11. In December 2021, a Focus Group on “Testbeds Federations for 5G and Beyond” (FG-TF5GB) will be proposed at ITU-T SG11. The objective of this new Focus Group would be to showcase initiatives, projects and standardisation activities linked to the testbed federation. The deliverables of this Focus Group can be potentially used for standardisation activities lead in the ITU-T SG11. The creation of the Focus Group has the support of Mandat International and members of ETSI TC INT, too.

- SG13 “Future networks, with focus on IMT-2020, cloud computing and trusted network infrastructures”: https://www.itu.int/en/ITU-T/studygroups/2017-2020/13/Pages/default.aspx. This Study Group is leading the standardisation on next-generation networks (NGN), future networks and mobile telecommunications (IMT). The convergence of ICT in the different industrial domains is supported by the standards developed in this Study Group. The architecture of cloud computing ecosystem is also a topic standardised by the Study Group.

8.2.5. National Institute of Standards and Technology (NIST)

The National Institute of Standards and Technology (NIST) is an American agency promoting American innovation and related industrial competitiveness. The domains where NIST is involved are diverse, and each NIST laboratory has a specific research domain of competence.

NIST has a Public Working Group on Federated Cloud (PWGFC): https://2020.standict.eu/standards-watch/nist-public-working-group-federated-cloud-pwgfc. This Public Working Group is in charge to federate the different community cloud environments, taking into account the business needs. The American government and the industry are working together in this Public Working Group to develop required frameworks, technologies, methodologies and related standards to ease the building of a Federated Community Cloud.

9. SLICES-SC lead partners in standardisation (WHO)

A contribution made to a Standards Development Organisation (SDO) often requires membership or an official affiliation for the legal entity or organisation writing the contribution. The survey permits identifying the partners who are actively involved in the standardisation activities in the SDOs and their memberships.

9.1. Identified partners' ongoing standardisation activities relevant to SLICES-SC

Table 6: Identified partners for the standardisation

Partners involved in the standardisation	SDO	Focal point
University of Thessaly	5G-PPP	Not defined
Mandat International	ITU-T, ETSI	Cédric Crettaz

The following table is showing more details concerning the standardisation activities expected to be done in the frame of the SLICES-SC project:

Table 7: Details on the standardisation activities

Partner	Organisation	Working Group / Study Group	Topic	Relevance to SLICES-SC (High – Low)	Status
UTH	5G-PPP	Software Networks Working Group	SDN/NFV	Low	
MI	ITU-T	SG11	Testbed federations and dedicated Open APIs, interoperability between testbeds	High	A dedicated Focus Group is proposed to handle this topic.
	ETSI	TC INT	Testbed federations and dedicated Open APIs, interoperability between testbeds, Testbed as a Service	High	In collaboration with ITU-T SG11 through the proposed Focus Group
	ETSI	ISG IPE	IPv6 connectivity between testbeds and nodes	High	

10. Synthetic strategy for standardisation

The standardisation activities are permanent and require contributions during the whole duration of the SLICES-SC project. So, a good strategy on the standardisation should be elaborated to choose the right priorities in terms of topics and SDOs. In the end, this strategy will increase the probabilities of successful contributions to the SDOs and have a bigger impact.

The synthetic strategy presented in this section is based on the results of the survey, in particular on the assets to be standardised, the partners' memberships, the relevant SDOs. Of course, the synthetic strategy can evolve during the project in the function of the inputs given by the project partners.

Table 8: Synthetic strategy for standardisation

WHAT	WHO		WHERE	
Research asset to be standardised	**Lead expertise / Contributors**	**Lead SDO facilitator**	**SDO**	**Working Group / Study Group**
Architecture of the testbed federation	COSMOTE, PSNC, UTH	MI	ITU-T	SG11
		MI	ETSI	TC INT
Testbed/Network interconnection	UTH, COSMOTE, PSNC, MI	MI	ETSI	ISG IPE
		UTH	5G-PPP	Software Networks Working Group
Interoperability and integration	UTH, MI	MI	ITU-T	SG11
		MI	ETSI	TC INT
Testbed/Infrastructure monitoring and management	COSMOTE, PSNC	MI	ETSI	TC INT
		MI	ITU-T	SG11
Experiment setup and monitoring	PSNC	MI	ETSI	TC INT
		MI	ITU-T	SG11

11. 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 9: Upcoming timeline

SDO	Working Group /Study Group	Date	Location
5G-PPP	Software Networks Working Group	TBC	
ITU-T	SG11	1-10 December 2021	Virtual
ETSI	TC INT	29 November – 2 December 2021	Sophia-Antipolis, FR
		21-24 March 2022	TBC
	ISG IPE	14 September 2021	Virtual
		26-27 October 2021	Virtual
		16 November 2021	Virtual

12. Conclusion

Deliverable 6.1 presented the SLICES-SC Dissemination, outreach, community building and standardisation Plan – the reference document for all WP6 activities that will support the promotion of the project's activities, achievements and benefits.

Communication activities, complemented by dissemination and standardisation efforts, are indispensable throughout the project's lifetime and interwoven into all the WPs. Consequently, the plan concisely demonstrates the motivations behind the strategy and specifies the actions, tools and assigned roles to communicate in an effective manner.

The present deliverable will act as a guide for all Consortium members in order to perform their communication activities, as it lists the target audience, communication channels, tools, activities and corresponding key performance indicators.

Concerning the standardisation, a strategy was designed in function of the information collected through a survey addressed to the project partners. This strategy allows good coordination and organisation of the standardisation activities of the SLICES-SC project. The Key Performance Indicators (KPIs) permit to assess the progress made in the standardisation area.

The topics or assets to be standardised are now defined:

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

Relevant Standards Developing Organisations (SDOs) where the activities of the project should happen in priority have been determined by the Consortium, namely ITU-T, ETSI and 5G-PPP. SDOs like IEEE and NIST are also considered. The partners involved in these SDOs were also identified for future contributions on the topics mentioned above.

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

13. Annex: Survey

Introduction

Dear partners, in order to pave the way to a successful standardisation and exploitation plan of the SLICES-SC results, we need your inputs. We are aware that as a research project, not all results are identified yet, but we would like to get from each partner a clear description of your expected standardisation plans out of the project. The results of this survey will be used to analyse and report on the standardisation strategy. The form has to be sent to: [redacted]

Partner name:

Person of contact name:

Person of contact email:

Person of contact phone number:

Part A – Partner perspective

1. Please define which exploitable results your organisation is planning to get from SLICES-SC? (Please fill in multiple categories if applicable and provide a clear description)

❑ Open-source technology enablers:

❑ Proprietary technology enablers:

❑ Products:

❑ Online services:

❑ Consulting service and/or technology transfer:

❑ Other (please specify):

2. What is, according to you, the value proposition of what we are developing in SLICES-SC?

Part B – Partner's Standardisation Activities

1. Please indicate any standardisation activities that your organisation is involved in (organisation and working group/study group):

Organisation	Working Group / Study Group	Topic	Relevance to SLICES-SC (High – Low)	Status

2. **What standardisation process should the project focus on?**

3. **What are the key elements (standardisable assets, research outputs, knowledge) that the project should push to standardisation?**

   - **…**
   - **…**
   - **…**

4. **What are the target Standards Developing Organisations (SDOs) that SLICES-SC should focus on? (Please be as detailed as possible: name of organisation and if possible, working group, question/subcommittee. This will help us build the standardisation plan)**

   - **…**
   - **…**
   - **…**

5. **Are you a member of a Standards Developing Organisation? Please specify.**

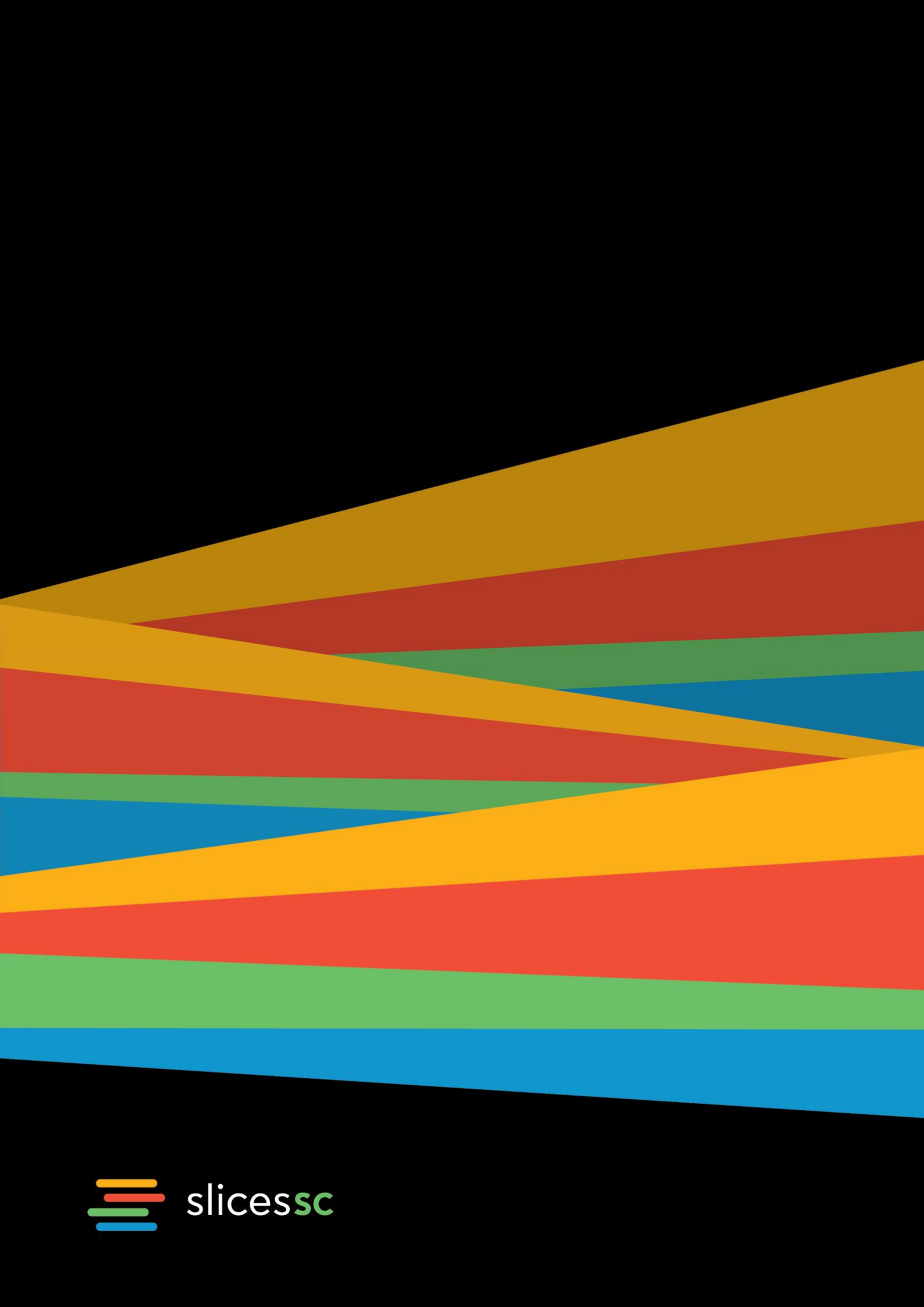
6. **Are you interested in making a joint contribution to standardisation with another SLICES-SC partner?**

7. **If you are not a member of a Standards Developing Organisation, would you be interested to collaborate with a partner who already has a membership and make a joint contribution?**

8. Please fill in the following table with the relevant standardisation information about your organisation. Please identify a focal point in your organisation that we can contact to follow up with and update on the standardisation activities.

Partner	Name of lead(s)	E-mail(s)	Ready to lead new (yes/no)	Ready to collaborate (yes/no)	SDO(s)	Existing work items

9. Other remarks


slicessc