SPIDER NEWSLETTER ISSUE #5

We are pleased to announce the publication of the fifth and final issue of our Project newsletter!

SPIDER project, a 3-year Innovation Action (IA) funded under Horizon2020, that started in 2019, has now come to an end. The project focused on delivering an innovative Cyber Range as a Service platform that extends and combines the capabilities of existing telecommunication testbeds and cyber range into a unified facility for:

- testing new security technologies
- training modern cyber defenders in near-real world conditions
- supporting organisations and relevant stakeholders in making optimal cybersecurity investment decisions

SPIDER consortium consists of 19 partners (industries, SMEs, research institutes and universities) coming from nine European countries: Greece, Italy, Spain, France, Cyprus, UK, Denmark, Switzerland, Bulgaria. ERICSSON acts as the project coordinator.

SPIDER project consortium has completed the activities related to technical implementation and validation, according to plan producing important deliverables. Furthermore, several consortium members have attended a variety of events which attracted considerable numbers of participants. In this 5th and final issue of our Newsletter, we present some of the highlights, which the consortium achieved during these last 3 months.

In the Dissemination Activities section, we present a number of events, which we either organized ourselves or in which we participated. Also, we present a number of papers related to SPIDER, as well as some collaboration activities with other EU funded projects.

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PROJECT INFORMATION

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on all our latest news, developments, research & general information regarding the SPIDER project.

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This issue covers the final period of the project's implementation, from April to June 2022. During this period of time, the final outcome of the project has been delivered, which concern SPIDER's 5G Cyber Range .

During these last months of project's implementation, our main focus has been to conclude with the validation of the platform, and to examine if the stakeholders' requirements have been met. Valuable insights and feedback have been collected, providing a clear path to future improvements and developments for the platform. Thus, the main achievement during this final period was the release of the final integrated version of the SPIDER prototype, marking also the conclusion of the project.

◊ SPIDER Cyber Range Integration and Testing [WP6]
Deployment and validation of the integrated version of the SPIDER platform has been concluded. The SPIDER platform delivered a cyber-range framework that offers security testing and cybersecurity training services in the field of 5G. The framework offers four distinct learning modalities which **span from theoretical knowledge training to simulation and emulation exercises including the ability to evaluate econometric models**.

The final platform is delivered throughout a set of complementary web environments through which all identified user roles can benefit for accomplishing their functional requirements. These environments include:
- The educational 'portal' of the platform where trainers and trainees (red team members, blue team members) can perform theoretical and practical training activities
- The administration 'portal' that is used to perform administrative activities regarding slice management
- The simulation environment that is used to perform risk assessment and defensive strategy evaluation services.

Key activities of this project period have been performed towards the assessment of its quality. The project achieved the set requirements by even tackling requirements that have been initially prioritized as medium or low. The validation process proved that the final platform is characterized by a high TRL level and can hit the commercialization route, even if to achieve the status of a commercial product additional investment is required. Moreover, beyond the functional requirements, special emphasis has been given to the evaluation of the non-functional ones. The final prototype has been developed based on the collected requirements that covered all stakeholders. During this period, tangible examination showed that the final prototype provides a full coverage of all requirements since **all functionality and all corresponding components that have been sketched in the architecture have been fulfilled**. On top of that, several non-functional aspects related to ISO-25010 have been taken under consideration.

◊ Demonstration and Evaluation [WP7]

Main efforts during the period of the last three months of the project implementation have been placed in activities related to demonstration and evaluation of the SPIDER Cyber Range. The platform has been used and validated by a number of cybersecurity related experts, in three difference settings, through the execution of the pilot demonstration phase. The first one included the evaluation of "**Cybersecurity testing of 5G-ready applications and network services**" and "**Cybersecurity of next generation mobile core SBA**" over the SPIDER platform. The evaluation methodology, including the mechanisms specification to measure each scenario were detailed earlier in the project, and formed the basis of the process. General, 5G, Cybersecurity and Machine Learning KPIs have been used to measure and evaluate the performance, while valuable feedback on acceptance criteria and potential improvements has been received. The second setting included the evaluation of "**5G Security Training**", dedicated to both experts and non-expert users. In this second setting, apart from the use of KPIs, as well as its training goals, Quality of Experience metrics have been utilized. SPIDER project has described pilot validation procedure which consisted of two iterations. During these periods, the users/evaluators of the platform have interacted with the different modalities and validated the platform's performance and usability according to the KPIs and metrics defined. The validation of these pilots was a procedure that included human participants of cybersecurity experts and non-experts interacting with the SPIDER over different interfaces (hands on scenarios, cloud-based scenarios, and mini games over the web). The outcomes presented valuable lessons learned, thoroughly reported in official project deliverables. Finally, the third setting concerned the "**5G cybersecurity investment decision support**", with a two-fold scope: a) proving the value of the SPIDER platform in forecasting and estimating the impact of cyber-risks; and b) proposing efficient defence investments. To achieve this, it integrates the methodologies produced earlier in the project for **Asset pricing and impact loss analysis** and **A decision support framework for econometric analysis of cyber risk**. Specifically, through this 3rd setting, the Continuous Risk Assessment Engine (CRAE) and the Cybersecurity Investment Component (CIC) have been evaluated in terms of how cyber risk is mitigated when uncertainty over various cybersecurity metrics is taken into account, while showcasing the benefit of using SPIDER within the cybersecurity economics field. The final step in presenting SPIDER's security posture evaluation is the generation of a complete **penetration testing report**. This report is compiled using the tools utilized by the Security Assurance Platform modules, actively probing the discovered assets for exploitable vulnerabilities.

◊ SPIDER 5G Cyber Range Exploitation

Intense efforts were made in examining and defining a concrete plan for SPIDER 5G Cyber Range accessing the market. The SPIDER consortium elaborated on results of extensive market, business analysis, and exploitation activities of the project. At first, the potential customers of the SPIDER platform have been identified, extracting a value proposition for each of them. Based on this value proposition, a business model of the platform has been developed that lays the foundation for its commercial exploitation. The analysis of the competitive structure of the industry of reference has suggested a strategic positioning that strongly exploits the innovative features of the cyber range platform aiming at a clear differentiation with respect to competitors. Trends and market scenarios for the cyber range, 5G, and cyber training markets have been evaluated to better understand the challenges and needs of stakeholders and the foundations for the go-to market strategy have been laid. The proposed go-to-market strategy for commercial services is based on a multifaceted offering tailored to the value proposition for each prospective customer. These offerings leverage on the identification of a competitive advantage, benchmarking competitors, and on different the delivery models of the platform as well as the revenue models. Our analysis suggests segmenting the different game modalities developed in the project to bundle them into different offers. For the **Cyber Range as a Service** (**CraaS**) **offer**, pricing is expected to follow a freemium model in order to capture customers at first with an easy-to-access offer, and to entice them to tackle the most complex and value-added challenges later-on. The **on-premise offer**, which is proposed as an alternative to the cloud model, follows a more traditional model with annual licenses plus technical support. Finally, we discuss the sustainability aspects of the project results beyond its duration, including various aspects connected with licensing of open-source technologies, and through handling the use of knowledge and exercising IPR management.

Joint event "Training the European workforce of tomorrow: cyber ranges in practice"

The webinar was organised virtually on May 17th, 2022 and it was focused on a set of cyber ranges simulating realistic domain environments, equipment, infrastructures and data developed by three EU funded initiatives: CONCORDIA, SPIDER and FORESIGHT. Each project presented current progress, best practices and technical insights together with a practical demonstration of the respective cyber ranges as virtual training environments and how they can be used to simulate cyber incidents and attacks so IT professionals can hone their skills and prepare for real-world circumstances. On behalf of SPIDER, project's Technical Coordinator, Dr. Panagiotis Gouvas (UBITECH) introduced SPIDER's novel 5G specific Cyber Range. Finally, a panel discussion moderated by ECSO looked at how Europe is bringing together different initiatives with the aim of tackling the cybersecurity skills gap and how R&I projects can play an active role producing practical tools and services to address it quickly and comprehensively. Please visit the event's webpage to learn more. Watch the video recording of the event available at SPIDER's YouTube channel.

SPIDER Technology Transfer event to SMEs

SPIDER partner FORTH organised a successful Technology Transfer event to SMEs, on May 5th 2022. 20 participants from 8 SMEs were introduced to the SPIDER Cyber Range technologies. The event took place online and had a duration of two hours. Read more at https://spider-h2020.eu/2022/05/16/spider-organised-a-technology-transfer-event-to-smes/.

1st Open Annual Workshop on Future ICT

SPIDER was presented at the "1st Open Annual Workshop on Future ICT" by Mrs. Konstantina Papachristopoulou, from project partner Eight Bells Ltd., which also was the event organiser and promoter. The event took place physically in Athens, Greece, on May 25th 2022. More information can be found at https://www.8bellsresearch.com/workshop/.

First European Defence Innovation Day Conference & Exhibition, May 31st, 2022, Brussels

SPIDER was demonstrated in the exhibition organised in the framework of the First European Defence Innovation Day. Project partner UBITECH organised SPIDER's presence at the exhibition. Project's Technical Coordinator, Dr. Panagiotis Gouvas (UBITECH) demonstrated during the exhibition, SPIDER's novel 5G specific Cyber Range to the visitors. Read more at https://spider-h2020.eu/2022/06/02/spider-demonstrated-at-the-first-european-defence-innovation-day/.

EUROSATORY2022

SPIDER was demonstrated in the exhibition organised in the framework of EUROSATORY 2022, Defence and Security global event. The event took place from June 13th to 17th in Paris. Project partner 8BELLS organised SPIDER's presence at the exhibition, through the presentation of SPIDER promo video, at 8BELLS's stand.

The 1st International Cybersecurity Challenge

The 1st International Cybersecurity Challenge (ICC) took place in Athens, from 14 to 17 of June 2022. This first edition of the event brought together more than 4.000 young talents, coming from 64 countries from regions of Europe, North America, Asia, Africa and Oceania. SPIDER project was demonstrated from our colleagues from UPRC and UBITECH project partners, with the presence of the project's P.O. Mr. Georgios Kaiafas. Read more at https://spider-h2020.eu/2022/06/22/spider-1st-icc/.

International Workshop on Massive Digital Twins for the Computer-Networks Evolution (TwinNets)

Our partners from THALES presented a paper in the 1st International Workshop on Massive Digital Twins for the Computer-Networks Evolution - TwinNets 2022, on 14th of June 2022. The event was co-located with the 23rd IEEE International Symposium on a World of Wireless, Mobile and Multimedia Networks (WoWMoM). Read more at https://spider-h2020.eu/2022/06/16/spider-presented-at-twinnets-2022/.
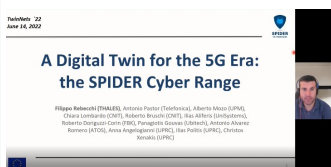
SPIDER 5G Cyber Range – Promo video

Video explaining the basic functionalities and services of the 5G Cyber Range, developed in the framework of SPIDER H2020 Research project is now available. Watch this sort video and find out more about the SPIDER offer regarding the Cybersecurity platform for virtualised 5G cyber range services. You may watch it at SPIDER's YouTube channel at https://youtu.be/
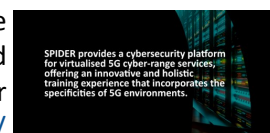
Journal Papers

- A. González-Prieto, A. Mozo, S. Gómez-Canaval, E. Talavera, "*Improving the quality of generative models through Smirnov transformation*", Information Sciences (2022), doi: https://doi.org/10.1016/j.ins.2022.07.066
  Available for download at Science Direct

- Mozo A, Karamchandani A, Gómez-Canaval S, Sanz M, Moreno JI, Pastor A. "*B5GEMINI: AI-Driven Network Digital Twin*". Sensors. 2022; 22(11):4106. https://doi.org/10.3390/s22114106
  Available for download at MDPI

- R. Bolla, R. Bruschi, F. Davoli, C. Lombardo and J. F. Pajo, "*Multi-site Resource Allocation in a QoS-Aware 5G Infrastructure*," in IEEE Transactions on Network and Service Management, doi: 10.1109/TNSM.2022.3151468.
  Available for download at IRIS UNIGE

Conference Papers

- R. Bolla, R. Bruschi, A. Carrega, F. Davoli and C. Lombardo, "*Trading off Power Consumption and Delay in the Execution of Network Functions by Dynamic Activation of Processing Units*," 2022 IEEE 8th International Conference on Network Softwarization (NetSoft), 2022, pp. 1-6, doi: 10.1109/NetSoft54395.2022.9844039.
  Available for download at ZENODO

SPIDER White Paper #2

During the second period of the SPIDER project lifecycle and towards the completion of defined milestones and objectives, the consortium partners worked intensively in designing, developing, deploying and validating SPIDER's 5G Cyber Range integral components. The purpose of this White Paper is to provide an overview of the technical aspects of our cyber arena, based on the work performed and completed within the second half of the project. Available for download at https://spider-h2020.eu/publications/#White-Papers.
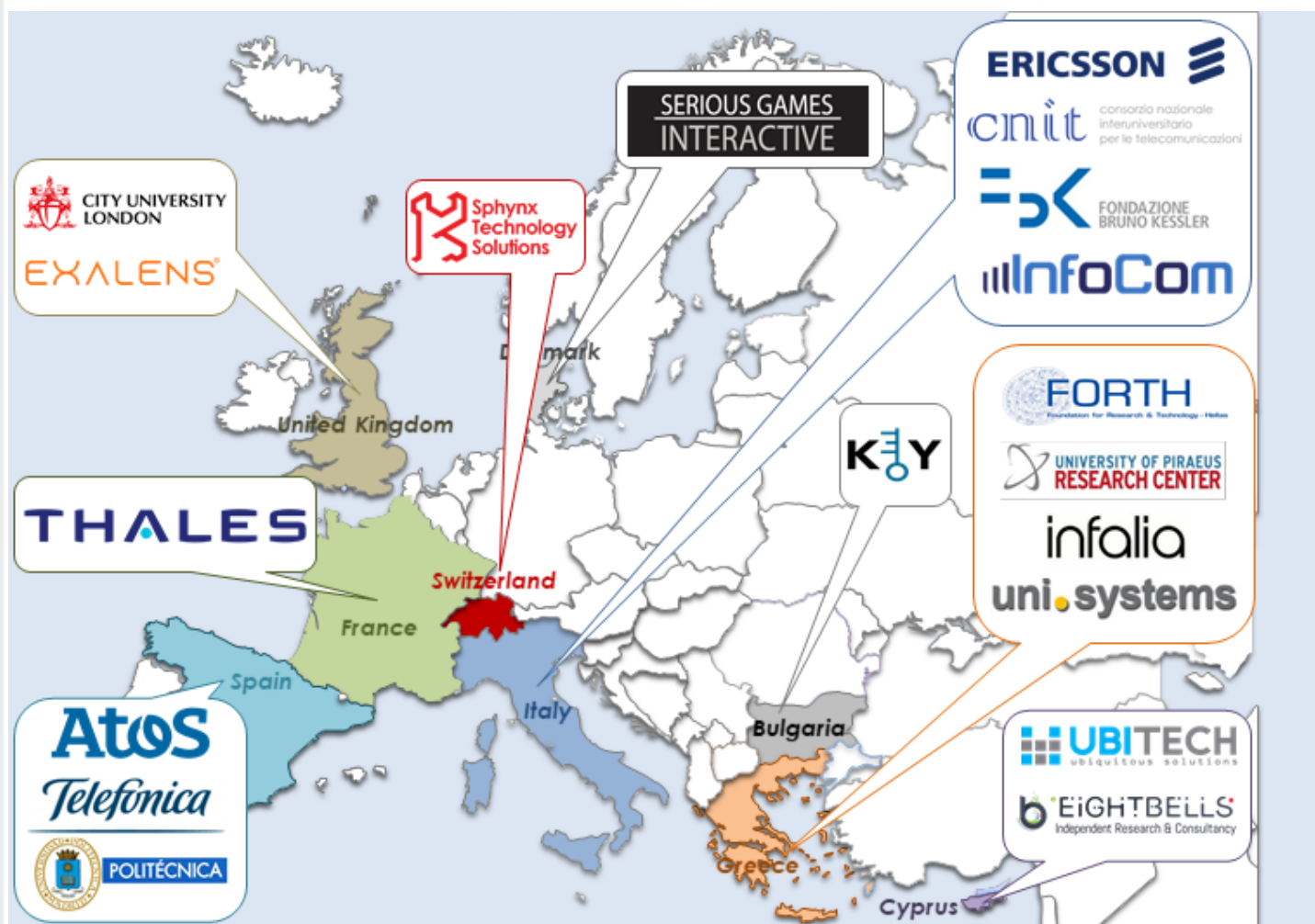
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SPIDER
5G CYBER RANGE

SPIDER Consortium at a glance

SPIDER Website & Social Media

Please find more information about SPIDER:

- www.spider-h2020.eu
- spiderh2020_eu
- SPIDER.H2020
- SPIDER H2020 FUNDED PROJECT