SEMANTIC

end-to-end Slicing and data-drivEn autoMAtion of Next generation cellular neTworks with mobIle edge Clouds

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WP5 – Training

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Authors

Name	Organization	Email
Prof. Tommy Svensson	CLM	tommy.svensson@chalmers.se
Mehdi Sattari	CLM	mehdi.sattari@chalmers.se
Azadeh Tabeshnezhad	CLM	azadeh.tabeshnezhad@chalmers.se

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Executive summary

This report summarizes the training activities, including feedback from early stage researchers (ESRs) and involved experts from the second (extended due to pandemic) year of activities. It reports on the School 3 and 4.

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1 Introduction

Work package 5 (WP5) in SEMANTIC is responsible for planning, organizing and executing the training events, schools and courses of the project. This report summarizes the training activities, including feedback from the early stage researchers (ESRs) and involved experts from the second (extended due to pandemic) year of activities.

The planned training activities within SEMANTIC are as in Table 1.

Table 1. Planned training activities within SEMANTIC.

	Main Training Events & Conferences	ECTS	Lead Partner	Month
1	School 1: 5G architectures, enabling technologies, vertical industries and KPIs	no	NOKIA (ind)	M12→M14
2	School 2: E2e validation of 5G networks: key analytical, prediction, simulation, experimental tools	no	EUR (ac)	M12→M14
3	First SEMANTIC Industrial Dissemination Day	no	TLN (ind)	M13→ M32
4	Course 1: Intellectual skills, scientific writing and research integrity	no	UOA (ac)	M14→ M18
5	Course 2: Team skills, leadership, multi-cultural awareness and gender issues	no	PDT (ac)	M14→M18
6	First Workshop	no	CLM (ac)	M20→M21
7	School 3: PHY layer techniques and design principles in 5G New Radio	no	CLM (ac)	M20→M25
8	School 4: MEC-empowered service provisioning and integration in 5G networks	no	FOG (ind)	M20→M25
9	School 5: Emerging models and trends for dynamic network slicing and resource virtualization	no	CTTC (ac)	M24→M29
10	School 6: Leveraging data analysis and machine learning for network management and automation	no	TLN (ind)	M24→M29
11	Course 3: Influence, outreach and communication skills	no	IQU (ind)	M28→M30
12	Course 4: IRP management and standardization	no	NOKIA (ind)	M28→M30
13	Second SEMANTIC Industrial Dissemination Day	no	NI (ind)	M32→M42
14	Second Workshop	no	EUR (ac)	M34
15	Course 5: Fundraising, Strategic Management and Entrepreneurship	no	TLN (ind)	M38
16	Final Conference	no	CTTC (ac)	M42→M48
17	Plenary Meetings	no	CTTC (ac)	3 per year

In Chapter 2 we report on the third and fourth schools, School 3 “PHY layer techniques and design principles in 5G New Radio” and School 4 “MEC-empowered service provisioning and integration in 5G networks”.

All activities were held online, due to the pandemic, and the content of SEMANTIC Schools and Courses (slides, presentations, photos, etc.) are available to the ESRs in the SEMANTIC cloud.

2 School 3 and 4

School 3 “PHY layer techniques and design principles in 5G New Radio” and School 4 “MEC-empowered service provisioning and integration in 5G networks” were composed of 16 speeches by 9 different speakers over 2+2 days during the period Jan 26 - Feb 2, 2022.

2.1 Agenda School 3

1st Day – 28th January 2022 (Time zone: GMT+2)

Time	Speaker	Tentative Title	Syllabus
09.00-10.30	Prof. George Alexandropoulos (National and Kapodistrian University of Athens)	Full Duplex MIMO Systems: From Efficient Spectrum Usage to Joint Communications and Sensing	• Full duplex radios • Beamforming and MIMO Systems • Full duplex MIMO architectures • Optimization formulations for sum-rate maximization
10.30-11:00	Coffee Break		
11.00-12.30	Prof. George Alexandropoulos (National and Kapodistrian University of Athens)	Full Duplex MIMO Systems: From Efficient Spectrum Usage to Joint Communications and Sensing	• Extensions for imperfections and wideband operation • Full duplex with hybrid A/D beamforming • Simultaneous data communication and channel estimation • Direction-assisted beam management • Integrated millimeter-wave communications and sensing
12.30-13:30	Lunch Break		
13.30-15.00	Prof. Theodoros Tsiftsis (University of Thessaly)	Reconfigurable Intelligent Surfaces for 6G: Principles, Recent Advances, and Future Research Trends	• Introduction • RIS • Recent Advances and Future Research
15.00-15:30	Coffee Break		
15.30-17.00	Prof. Theodoros Tsiftsis (University of Thessaly)	Physical Layer Aspects of Ultra-Reliable Low-Latency Communication (URLLC)	• URLLC • Introduction and Advanced Topics on PHY for URLLC

2nd Day – 2nd February 2022 (Time zone: CET)

Time	Speaker	Title	Syllabus
09.00-10.30	Dr. Stefan Parkvall (Ericsson Research, Sweden)	5G and Beyond – part 1	• Cellular systems and basics for LTE (4G) in brief, and NR (5G) • LTE evolution • NR
10.30-11:00	Coffee Break		
11.00-12.30	Dr. Stefan Parkvall (Ericsson Research, Sweden)	5G and Beyond – part 2	• Standardization in practice • Beyond 5G
12.30-13:30	Lunch Break		
13.30-15.00	Dr. Mikael Coldrey (Ericsson Research, Sweden)	Wireless backhaul – introduction and evolution	• Introduction to backhaul in the 5G era • Spectrum & licensing • Wireless backhaul technologies in 5G and beyond
15.00-15:30	Coffee Break		
15.30-17.00	Prof. Tommy Svensson (Chalmers, Sweden)	Challenges and Opportunities with mmWave and sub-THz communications in 5G and Beyond	• European research towards 4G & 5G • mm-wave and sub-THz communications • Vision, use cases and key technical enablers in 6G from the EU H2020 Hexa-X Flagship perspective

2.2 Agenda School 4

1st Day – 26th January 2022 (Time zone: CET)

Time	Speaker	Tentative Title	Syllabus
09.30-10.30	Dr. Angelos Antonopoulos (Nearby Computing Spain)	Introduction on Edge Computing: Fundamentals, Standardization and Analytical Tools	• Introduction on Edge Computing • Standardization Efforts • MEC in 5G • NearbyOne Orchestrator
10.30-11:00	Coffee Break		
11.00-12.30	Dr. Angelos Antonopoulos (Nearby Computing Spain)	Introduction on Edge Computing: Fundamentals, Standardization and Analytical Tools	• Research Projects (Use Cases) • Bankruptcy theory in Network Sharing • Edge AI
12.30-13:30	Lunch Break		
13.30-15.00	Dr. Mahdi Azari (SnT, University of Luxembourg)	Integrated UAV-MEC Networks: Scenarios, Challenges, Technologies	• Main Paradigms • Cellular MEC Servers for UAVs: modeling and performance • Energy Consumption • RL for UAVs Requirements – Case Study
15.00-15:30	Coffee Break		
15.30-17.00	Dr. Mahdi Azari (SnT, University of Luxembourg)	Integrated UAV-MEC Networks: Scenarios, Challenges, Technologies	• Q&A

2nd Day – 27th January 2022 (Time zone: CET)

Time	Speaker	Tentative Title	Syllabus
09.00-10.30	Dr. Vincenzo Sciancalepore (NEC Labs Europe Ltd)	Multi-access Edge Computing: The driver behind the (B)5G Revolution	• Introduction to 5G services • Edge computing, virtualization • Network slicing
10.30-11:00	Coffee Break		
11.00-12.30	Dr. Vincenzo Sciancalepore (NEC Labs Europe Ltd)	Multi-access Edge Computing: The driver behind the (B)5G Revolution	• ETSI MEC - preliminaries • ETSI MEC – standard documents • MEC and slicing
12.30-13:30	Lunch Break		
13.30-15.00	Dr. Elli Kartsakli (Supercomputing Center Barcelona)	Introduction to the edge computing paradigm and the MEC standard	• Introduction to the edge computing paradigm • Edge computing deployment and implementation aspects • The ETSI MEC reference architecture
15.00-15:30	Coffee Break		
15.30-17.00	Dr. Elli Kartsakli (Supercomputing Center Barcelona)	Distributed computation in heterogeneous edge cloud compute continuum environments	• Edge computing for Cyber Physical Systems • Introduction to task-based parallel programming models and the BSC COMPSs framework • Distributed computing application examples: The CLASS and ELASTIC use cases

2.3 Survey results

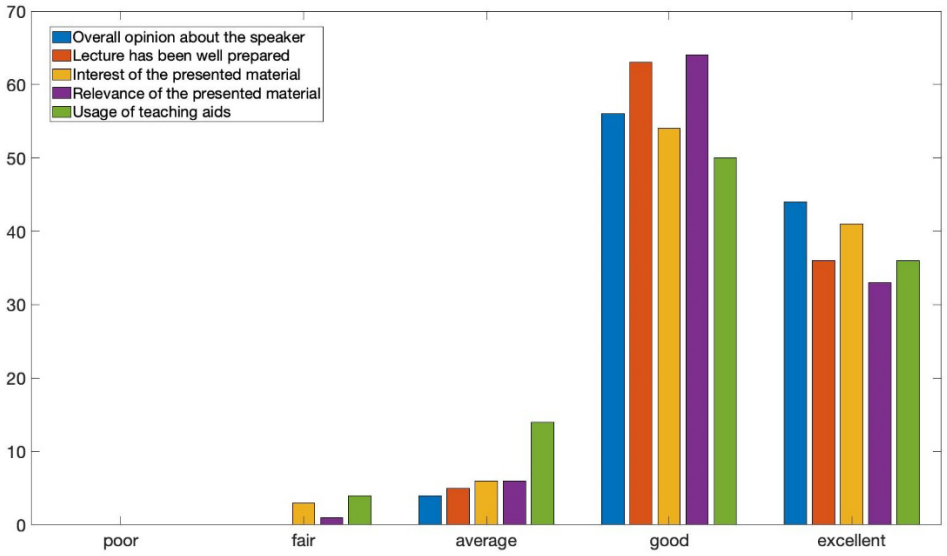

Fig.1. Overview of the feedback on School 3 & 4.

In Fig. 1, we summarize the survey results for School 3 and 4. As can be seen, the seminars were almost all well received. In total 12 out of 14 ESRs responded (one ESR was under re-recruitment).

In the surveys there were also the opportunity to provide additional comments, but no comments were received.

3 Conclusions

The second year (extended due to the pandemic) of the SEMANTIC Training activities have been implemented with the scope as planned in the DoA. School 3 & 4 were well received by the ESRs. This is especially encouraging, given that all activities were held online due to the pandemic.

4 References

None.