SMACITE

Enhancing skills for smart city tech

SMACITE

Boosting the technical and non-technical skills and competences of smart cities technicians and engineers

WP7: Impact, dissemination and exploitation

D7.7: Project impact assessment report

Final version

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DELIVERABLE FACTSHEET

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PROJECT SUMMARY

The project aims to address the skills gap of Smart Cities technicians and engineers, by designing and testing a vocational education and training program that is based on a novel and multi-disciplinary curriculum combining digital skills on Smart Cities enabling technologies, with soft, entrepreneurship and green skills.

The expected project outputs are:

- A Smart Cities competences map and ESCO-compliant Smart Cities job profiles.
- A Smart Cities curriculum combining both technical and non-technical skills and competences and promoting personalized learning pathways.
- Learning resources for Smart Cities enabling technologies and for building the soft, entrepreneurship and green skills of Smart Cities technicians and Engineers.
- A diagnostic tool to identify personalized learning pathways.
- A MOOC for Smart Cities enabling technologies.
- Virtual Worlds for building the soft, green and entrepreneurship skills of Smart Cities technicians and engineers.

The main project beneficiaries are Smart Cities technician and engineers either from the public sector (i.e. municipalities) or enterprises providing Smart Cities solutions, as well as HEI and VET students interested in Smart Cities.

The curriculum will be tested through 4 national pilots in Greece, Bulgaria, Spain and Italy with at least 160 trainees. The certification of the skills and competences will follow a two-fold approach: (a) using micro-credentials to recognize the knowledge and skills gained through the successful completion of each online training module at the MOOC and Virtual Worlds and (b) designing the “Smart Cities Specialization Certification” that will be awarded to those passing online certifications exams with e-proctoring after the completion of the training modules.

The project will create an ecosystem for the co-design and co-development of an innovative curriculum and technology-enhanced learning tools for the upskilling/reskilling of Smart Cities technicians and engineers.

1 Introduction

This deliverable is the SMACITE impact assessment report that discusses the project impact on SMACITE partners, as well as different stakeholders, i.e. learners, enterprises and public organizations, education and training providers (HEIs and VET providers) and policy makers, including the broader European education and training ecosystem.

Note that the indicators discussed in this report have been used to measure the project short-term impact during its implementation. However, some of them can also be used to measure the medium and long-term term impact of the project after its end (e.g. the indicators concerning the impact on policy makers and the broader European education and training ecosystem).

1.1 Structure of the deliverable

The deliverable is divided into 6 main Sections.

- **Section 1** introduces the deliverable. Section 1.1 describes the structure of the deliverable, Section 1.2 outlines the target audience and Section 1.3 describes the dependencies with other WPs and deliverables.
- **Section 2** discusses the project impact on SMACITE partners.
- **Section 3** discusses the project impact on learners.
- **Section 4** discusses the project impact on enterprises and the public organizations.
- **Section 5** discusses the project impact on education and training providers (HEIs and VET providers).
- Finally, **Section 6** discusses the project impact on policy makers and the broader European education and training ecosystem.

1.2 Target audience

The target audience of the deliverable includes the following stakeholders:

- The SMACITE participating organizations.
- Any other stakeholder that is interested in SMACITE project and its results.

1.3 Dependencies with other WPs and deliverables

Deliverable D7.7 has direct connections with D6.3 developed under WP6. The project evaluation plan describes the process for the evaluation of the project results and impact.

2 Impact on SMACITE partners

During its 3 years implementation, the SMACITE project has created a substantial impact on the SMACITE partnership by bringing together partners from Higher Education, VET, industry and the VET sector with diverse expertise and competences. The impact of the project on the SMACITE partners is summarized as follows:

- Sharing of knowledge, experience, and good practices at the area of education and training.
- Strengthening the interconnection and the exchange of knowledge and expertise between HEIs, VET providers, research, industry, and the public sector creating the conditions for an all-around, up-to-date education and training in the Smart Cities sector.
- Deeper understanding of different perspectives concerning the identification of adult training needs, as well as the provision of training courses.
- Increased awareness of the technical and non-technical competences needs of Smart Cities technicians and engineers and how these affect their interaction with the market.
- Renewal of their services based on project deliverables.

Table 1 discusses the indicators used to measure the project impact on the SMACITE partners, including the achieved performance.

Partnership	Indicator	Achieved performance
Sharing of knowledge, experience, and good practices at the area of education and training.	SMACITE partners' perspective on the creation of a new ecosystem for sharing knowledge, experience and good practices	4.21 average score on a scale from 1=totally disagree up to 5=totally agree
	SMACITE partners' perspective about project's inspiration for future actions/initiatives on innovative educational content and tools	4.50 average score on a scale from 1=totally disagree up to 5=totally agree
Strengthening the interconnection and the exchange of knowledge and expertise between HEIs, VET providers, research, industry, and the public sector creating the conditions for an all-around, up-to-date education and training in the Smart Cities sector.	SMACITE partners' perspective on strengthening the interconnection and exchange of knowledge among the diverse stakeholders	4.71 average score on a scale from 1=totally disagree up to 5=totally agree
Deeper understanding of different perspectives concerning the identification of adult training needs, as well as the provision of training courses.	SMACITE partners' perspective on project contribution towards gaining (on personal and organisation level) a deeper understanding of different perspectives concerning the identification of adult training needs, as well as the provision of training courses	4.50 average score on a scale from 1=totally disagree up to 5=totally agree
Increased awareness of the technical and non-technical competences needs of Smart Cities technicians and engineers and how these affect their interaction with the market.	SMACITE partners' perspective on the project's contribution towards the increase of awareness concerning the technical and non-technical competences needs of Smart Cities technicians and engineers and how these affect their interaction with the market	4.93 average score on a scale from 1=totally disagree up to 5=totally agree
Renewal of their services based on project deliverables.	SMACITE partners' intention to exploit project results	3.92 average score on a scale from 1=totally disagree up to 5=totally agree

Table 1: Project impact on SMACITE partners

3 Impact on learners

The SMACITE project has also created an impact on learners:

- Increased awareness of the required skills and competences of Smart Cities engineers and technicians.
- Development of a clear understanding of the set of knowledge, skills and competences required for the occupations of Smart Cities Engineers and Technicians.
- Benefit from an enhanced set of skills, including technical expertise in Smart Cities technologies, soft skills, entrepreneurship, and green skills.
- Tailored educational experiences based on individual needs and interests using the diagnostic tool developed.
- Improvement of technical and non-technical knowledge, skills, and competences.
- The use of micro-credentials and a specialized certification offers learners formal recognition and transferability for their acquired knowledge and skills.
- Improvement of future employability in the Smart Cities sector.
- Increased mobility of Smart Cities technicians and engineers between EU countries by gaining recognized and transferable competences.

Table 2 discusses the indicators used to measure the project impact on the learners, including the achieved performance.

Learners	Indicator	Achieved performance
Increased awareness of the required skills and competences of Smart Cities engineers and technicians.	Number of students using the diagnostic tool to identify their training needs	129 students used the diagnostic tool for Smart Cities Engineers to perform 438 assessments of knowledge & skills related to 9 different courses. 76 students used the diagnostic tool for Smart Cities Technicians to perform 238 assessments of knowledge & skills related to 9 different courses.
	Number of WP2 deliverables downloads from the project website	278 (at the time or writing the report not all WP2 deliverables was uploaded at the project website)
Development of a clear understanding of the set of knowledge, skills and competences required for the occupations of Smart Cities Engineers and Technicians	Number of students using the diagnostic tool to identify their training needs	129 students used the diagnostic tool for Smart Cities Engineers to perform 438 assessments of knowledge & skills related to 19 different courses. 76 students used the diagnostic tool for Smart Cities Technicians to perform 238 assessments of knowledge & skills related to 19 different courses.
	Number of WP2 deliverables downloads from the project website	278 (at the time or writing the report not all WP2 deliverables was uploaded at the project website)
	Learners' perspective on the improvement of their competences and employability in the Smart Cities sector	4.15 average score (using a scale 1-5) on the evaluation criteria "The course enhanced my knowledge of the subject matter" among the technical courses for Smart Cities Engineers and Technicians. 4.02 average score (using a scale 1-5) on the evaluation criteria "The course will be useful in my work" among the technical courses for Smart Cities Engineers and Technicians.
Benefit from an enhanced set of skills, including	Number of students enrolled in the MOOC	331

technical expertise in Smart Cities technologies, soft skills, entrepreneurship, and green skills	Number of students enrolled in each course in the MOOC.	745 enrolled learners (not unique) in 10 courses for Smart Cities Engineers 388 enrolled leaners (not unique) in 10 courses for Smart Cities Technicians. Some learners have been enrolled in more than 1 course.
	Number of students enrolled in each course in the Virtual Worlds	13 students enrolled in the Virtual World training on soft skills. 26 students enrolled in the Virtual World training on entrepreneurship skills. 34 students enrolled in the Virtual World training on green skills.
	Learners' perspective on the improvement of their competences and employability in the Smart Cities sector after the completion of the training	4.15 average score (using a scale 1-5) on the evaluation criteria "The course enhanced my knowledge of the subject matter" among the technical courses for Smart Cities Engineers and Technicians. 4.02 average score (using a scale 1-5) on the evaluation criteria "The course will be useful in my work" among the technical courses for Smart Cities Engineers and Technicians.
Tailored educational experiences based on individual needs and interests using the diagnostic tool developed	Number of students using the diagnostic tool to identify their training needs and select the educational experience that fits their needs	129 students used the diagnostic tool for Smart Cities Engineers to perform 438 assessments of knowledge & skills related to 9 different courses. 76 students used the diagnostic tool for Smart Cities Technicians to perform 238 assessments of knowledge & skills related to 9 different courses.
Improvement of technical and non-technical knowledge, skills, and competences.	Number of students who successfully completed one or more courses in the MOOC.	147 students have completed at least one module of a course. 87 students completed at least one course.
	Percentage of students who successfully completed one or more courses in the Virtual Worlds.	100%

	Number of students who gain the certification for Smart Cities Technician or Engineer.	30 students have gone through the online exams leading to the certification. 24 students got the Smart Cities Specialization Certification
	Improved horizontal skills of students (soft skills, entrepreneurial skills, green skills)	4.29 average score (using a scale 1-5) on the evaluation criteria "Did the training help you to build your soft skills". 4.33 average score (using a scale 1-5) on the evaluation criteria "Did the training help you to build your entrepreneurial skills". 4.42 average score (using a scale 1-5) on the evaluation criteria "Did the training help you to build your green skills".
	Improved digital skills of students and trainers	4.15 average score (using a scale 1-5) on the evaluation criteria "The course enhanced my knowledge of the subject matter" among the technical courses for Smart Cities Engineers and Technicians.
The use of micro-credentials and a specialized certification offers learners formal recognition and transferability for their acquired knowledge and skills	Number of students participating in the online exams.	30 students have gone through the online exams leading to the certification.
	Number of students who gain the certification for Smart Cities Technician or Engineer.	24 students got the Smart Cities Specialization Certification
	Number of students who successfully complete one or more courses in the MOOC.	147 students have completed at least one module of a course. 87 students completed at least one course.
	Percentage of students who successfully complete one or more courses in the Virtual Worlds.	100%

Improvement of future employability in the Smart Cities sector	Improved horizontal skills of students (soft skills, entrepreneurial skills, green skills)	4.29 average score (using a scale 1-5) on the evaluation criteria "Did the training help you to build your soft skills". 4.33 average score (using a scale 1-5) on the evaluation criteria "Did the training help you to build your entrepreneurial skills". 4.42 average score (using a scale 1-5) on the evaluation criteria "Did the training help you to build your green skills".
	Improved digital skills of students	4.15 average score (using a scale 1-5) on the evaluation criteria "The course enhanced my knowledge of the subject matter" among the technical courses for Smart Cities Engineers and Technicians.
	Number of trainees that have improved their working conditions six months after completion of the training	It is not possible to measure this indicator within the project lifetime.
	Number of trainees that have changed working environment or responsibilities six months after the completion of the training	It is not possible to measure this indicator within the project lifetime.
Increased mobility of Smart Cities technicians and engineers between EU countries by gaining recognized and transferable competences	Number of trainees for which the training will increase their mobility potential due to recognition of the certified competences	It is not possible to measure this indicator within the project lifetime.

Table 2: Project impact on learners

4 Impact on enterprises and public organisations

The project impact on enterprises and the public sector is summarized as follows:

- Upskilled workforce with a comprehensive understanding of Smart Cities technologies and a mix of essential soft, entrepreneurship, and green skills.
- The creation of ESCO-compliant Smart Cities job profiles ensures that the skills developed align with industry needs, making it easier for enterprises to identify suitable candidates.
- Access to free training content and toolkits for public organizations and enterprises that lack training facilities and resources.
- Increased awareness of the required skills and competences of Smart Cities engineers and technicians.
- Closer cooperation between stakeholders from the education, industry, research and public sector for the creation and consolidation of a knowledge flow ecosystem.
- Increased competences for developing sustainable Smart Cities.

Table 3 discusses the indicators used to measure the project impact on enterprises and the public sector, including the achieved performance.

Enterprises and public sector	Indicator	Achieved performance
Upskilled workforce with a comprehensive understanding of Smart Cities technologies and a mix of essential soft, entrepreneurship, and green skills.	Number of students enrolled in each course in the MOOC.	745 enrolled learners in 10 courses for Smart Cities Engineers 388 enrolled leaners in 10 courses for Smart Cities Technicians. Some learners have been enrolled in more than 1 course.
The creation of ESCO-compliant Smart Cities job profiles ensures that the skills developed align with industry needs, making it easier for enterprises to identify suitable candidates.	Not applicable	Not applicable
Access to free training content and toolkits for public organizations and enterprises that lack training facilities and resources.	Number of learning resources developed	218
	Number of MOOCs developed	10 for Smart Cities Engineers 10 for Smart Cities Technicians 3 for building soft, entrepreneurial and green skills
	Number of Virtual Worlds developed	3 for building soft, entrepreneurial and green skills
Increased awareness of the required skills and competences of Smart Cities engineers and technicians.	Number of WP2 deliverables downloads from the project website	278 (at the time or writing the report not all WP2 deliverables was uploaded at the project website)
	Number of publications made by SMACITE partners concerning the required skills and competences of Smart Cities engineers and technicians with reference to the SMACITE project	2 publications in well-known journals 2 publications in well-know international conferences
Closer cooperation between stakeholders from the education, industry, research and public sector for the creation and consolidation of a knowledge flow ecosystem	Partnership Development - Number of signed MOUs	1 MOU between SMACITE partners 4 MOUs between SMACITE and other organizations/projects.

Increased competences for developing sustainable Smart Cities	Improved digital competences of students	4.15 average score (using a scale 1-5) on the evaluation criteria "The course enhanced my knowledge of the subject matter" among the technical courses for Smart Cities Engineers and Technicians.

Table 3: Project impact on enterprises and public organizations

5 Impact on education and training providers (HEIs and VET)

The project impact on education and training providers is summarized as follows:

- Building further their capacity to provide enterprises and the public sector with high-skilled Smart Cities technicians and engineers and thus meet their demand.
- Development of an ecosystem for the co-design and co-development of innovative educational content and tools.
- Closer cooperation with enterprises and the public sector for the creation and consolidation of a knowledge flow ecosystem.
- The use of micro-credentials and a specialized certification enhances the recognition of training programs provided by education and training providers.
- Increasing their visibility and competences on Smart Cities and becoming more attractive to future students
- Increased awareness of the required skills and competences of Smart Cities engineers and technicians.
- Renewal of training and education offerings based on SMACITE curriculum and learning resources.

Table 4 discusses the indicators used to measure the project impact on education and training providers, including the achieved performance.

Education and training providers	Indicator	Achieved performance
Building further their capacity to provide enterprises and the public sector with high-skilled Smart Cities technicians and engineers and thus meet their demand.	Number of students enrolled in each course in the MOOC.	745 enrolled learners (not unique) in 10 courses for Smart Cities Engineers 388 enrolled leaners (not unique) in 10 courses for Smart Cities Technicians. Some learners have been enrolled in more than 1 course.
Development of an ecosystem for the co-design and co-development of innovative educational content and tools.	SMACITE partners' perspective on the creation of a new ecosystem for sharing knowledge, experience and good practices	4.21 average score on a scale from1=totally disagree up to 5=totally agree
	SMACITE partners' perspective about project's inspiration for future actions/initiatives on innovative educational content and tools	4.50 average score on a scale from1=totally disagree up to 5=totally agree
Closer cooperation with enterprises and the public sector for the creation and consolidation of a knowledge flow ecosystem.	Partnership Development - Number of signed MOUs	1 MoU between SMACITE partners
The use of micro-credentials and a specialized certification enhances the recognition of training programs provided by education and training providers.	Number of organizations considering adopting the micro-credentials and the specialized certification scheme suggested by SMACITE	7
Increased awareness of the required skills and competences of Smart Cities engineers and technicians.	Number of WP2 deliverables downloads from the project website	278 (at the time or writing the report not all WP2 deliverables was uploaded at the project website)
Renewal of training and education offerings based on SMACITE curriculum and learning resources.	Number of organizations expressing their intention to exploit project results	12 organizations have expressed their intention to exploit project results

Table 4: Project impact on education and training providers

6 Impact on policy makers and the broader European education and training ecosystem

The project impact on policy makers is summarised as follows:

- Increased awareness of the technical and non-technical competences needs of Smart Cities technicians and engineers and how these affect their interaction with the market.
- Advances in educational policies and EU priorities.
- Definition of priorities for the development of competences at non-technical/transversal areas, i.e. soft, entrepreneurship and green competences.

Moreover, the project impact on the broader European education and training ecosystem is the following:

- Increased capacity of higher education and vocational training to adapt to technological changes and industry's demand.
- Better matching between the supply and demand in the Smart Cities sector.
- Increased innovation and visibility of the European Education and Training ecosystem.

Table 5 discusses the indicators we propose to measure the project impact on policy makers and the broader European education and training ecosystem.

Policy makers	Indicator	Achieved performance
Increased awareness of the technical and non-technical competences needs of Smart Cities technicians and engineers and how these affect their interaction with the market.	Project contribution towards increasing the awareness of the technical and non-technical competences needs of Smart Cities technicians and engineers and how these affect their interaction with the market.	It is not possible to measure those indicators within the project lifetime.
Advances in educational policies and EU priorities.	Number of educational policies updated based on project results	
Definition of priorities for the development of competences at non-technical/transversal areas, i.e. soft, entrepreneurship and green competences	Number of priorities identified for the development of competences at non-technical/transversal areas, i.e. soft, entrepreneurship and green competences based on project results	
European Education and Training ecosystem		
Increased capacity of higher education and vocational training to adapt to technological changes and industry's demand.	Improvement in the capacity of higher education and vocational training to adapt to technological changes and industry's demand.	
Better matching between the supply and demand in the Smart Cities sector	Project contribution towards better matching between the supply and demand in the Smart Cities sector	
Increased innovation and visibility of the European Education and Training ecosystem	Project contribution towards the increased innovation and visibility of the European Education and Training ecosystem	

Table 5: Project impact on policy makers and the broader European education and training ecosystem

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